

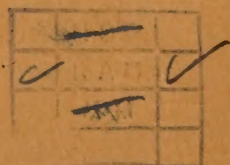


ANNUAL REPORT

1959



DEPARTMENT OF AGRICULTURE
NEW SOUTH WALES





1959
(SECOND SESSION)

PARLIAMENT OF NEW SOUTH WALES

REPORT
OF THE
DEPARTMENT OF AGRICULTURE
NEW SOUTH WALES

FOR THE
Year ended 30th June, 1959

BY COMMAND

Ordered to be printed, 3 November, 1959

Wholly set up and printed in Australia by
VICTOR C. N. BLIGHT, GOVERNMENT PRINTER, SYDNEY, NEW SOUTH WALES

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AS AT 30th JUNE, 1959

DEPARTMENT OF AGRICULTURE*

Minister for Agriculture	Hon. R. B. NOTT, M.L.A.
Under Secretary	Mr. E. O. TOUT.
Assistant Under Secretary	Mr. G. EDGAR.
Director of Agriculture	Dr. H. J. HYNES.
Central Administration—	
Accountant	H. J. CHARDON.
Chief Clerk	P. S. HILL.
Personnel Officer	C. B. CAMPBELL.
Pastures Protection Officer	S. W. WISE.
Legal Officer	J. L. HAGER.
Architect	H. A. BROWNE.
Biometrician	F. C. MCCLEERY.
Division of Plant Industry—	
Chief	W. H. G. POGGENDORFF.
Deputy Chief	A. C. ORMAN.
Principal Agronomist (Pastures)	C. K. VEARS.
Principal Agronomist (Research)	Dr. S. L. MACINDOE.
Principal Agronomist (Extension)	G. NICHOLSON.
Division of Horticulture—	
Chief	Dr. F. T. BOWMAN.
Deputy Chief	H. W. EASTWOOD.
Principal Fruit Officer (Extension)	J. A. BALLANTYNE.
Principal Fruit Officer (Research)	B. O. FRENCH.
Senior Inspector (Export and Import Branch)	L. T. BILBE.
Division of Animal Industry—	
Chief	C. C. BLUMER.
Deputy Chief	R. M. WATTS.
Director of Veterinary Research	Vacant.
Principal Veterinary Research Officer	J. C. KEAST.
Chairman, Board of Tick Control	J. N. HENRY.
Principal Veterinary Officer	N. K. GOLDING.
Principal Veterinary Officer (Meat Inspection)	R. A. HALL.
Principal Livestock Officer (Sheep and Wool)	A. K. CANTRILL.
Principal Livestock Officer (Horses, Cattle and Goats)	W. J. B. MURPHY.
Principal Livestock Officer (Pigs)	G. M. D. CARSE.
Principal Livestock Officer (Poultry)	V. H. M. BRANN.
Principal Livestock Officer (Apiculture)	A. A. CLEMSON.
Division of Dairying—	
Chief	A. C. SMALL.
Deputy Chief	I. W. SCOTT.
Principal Dairy Officer	J. D. L. MCGIBBON.
Principal Dairy Officer (Herd Improvement)	F. A. VERNON.
Division of Science Services—	
Chief	Dr. C. J. P. MAGEE.
Chief Biologist	Dr. C. J. P. MAGEE.
Chief Entomologist	S. L. ALLMAN.
Chief Chemist	T. H. JOHNS.
Chief Botanist and Curator, Royal Botanic Gardens and National Herbarium	R. H. ANDERSON.
Division of Information Services—	
Chief	H. PARRY BROWN.
Editor of Publications	R. J. K. SYNNOTT.
Organiser, Agricultural Bureau	J. J. SLATER.
Senior Extension Officer (Women's Service)	Miss N. M. FOSKETT.
Division of Marketing and Agricultural Economics—	
Chief	C. J. KING.
Principal Economics Research Officer	P. C. DRUCE.

As at 30th June, 1959
Department of Agriculture—*continued*

Regional Extension Services—

Chief	J. L. GREEN.
Regional Supervisors of Agriculture—	
Southern Region	R. C. MADSEN.
North Coast Region	S. R. BALLARD.
Western Region	B. D. AMENT.
South Coast and Tablelands	R. W. SHELLEY.
South-Western Region	G. A. CRAWFORD.
Northern Region	R. D. EASTOE.
Mid-Coast and Hunter Region	E. C. CONNOR.
Mid-Western Region	F. J. NICHOLSON.
North-Western Region	J. A. O'REILLY.

Hawkesbury Agricultural College—

Principal	H. R. RICHARDSON.
Deputy Principal	W. MCCARROL.
Farm Supervisor	T. ADAMS.

Wagga Agricultural College and Experiment Station—

Principal	B. DOMAN.
Farm Supervisor	J. G. BALLANTYNE.

Wagga Agricultural Research Institute—

Director	Dr. A. T. PUGSLEY.
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Experiment Farms and Stations—

Chief.....		A. PEARSON.
Bathurst Experiment Farm ..	Manager	C. H. MORT.
Condobolin Experiment Farm ..	Manager	J. C. ENGLAND.
Cowra Experiment Farm	Manager	J. M. ARTHUR.
Glenfield Veterinary Research Station	Director	Vacant.
Gosford Citrus Experiment Station	Officer-in-Charge	L. F. MANDELSON.
Grafton Experiment Farm ..	Manager	C. E. COLLINS.
Griffith Viticultural Nursery..	Superintendent	Vacant.
Leeton Experiment Farm	Manager	C. R. HOOD.
Lower Murray Research Station, Dareton.....	Officer-in-Charge	F. S. OLDHAM.
Narrabri Experiment Farm ..	Manager	T. R. LAWLER.
New England Experiment Farm	Manager	E. TINDALE.
Poultry Experiment Station, Seven Hills	Manager	D. C. DUNCAN.
Tamworth Agricultural Experiment Station	Officer-in-Charge	J. A. LOVERIDGE.
Temora Experiment Farm ..	Manager	F. D. MCKENZIE.
Trangie Agricultural Experiment Station	Manager	J. H. BALLARD.
Wollongbar Experiment Farm ..	Manager	W. J. C. HUDSON.
Yanco Experiment Farm	Manager	R. J. FLYNN.
Alstonville Tropical Fruit Research Station	Officer-in-Charge	D. S. LEIGH.

* For details of staff of the various Divisions and Branches see New South Wales Department of Agriculture brochure "Directory of Officers".
For staff number totals see tabulation in this Report, page 22.

1959

NEW SOUTH WALES

DEPARTMENT OF AGRICULTURE

Report of the Under Secretary to the Minister for the Year ended 30th June, 1959

Department of Agriculture,
Sydney, 7th October, 1959.

Dear Sir,

Herewith my Report for the Department of Agriculture for the year ended 30th June, 1959.

Retirement of Under Secretary and Director, Dr. R. J. Noble, C.B.E.

Dr. R. J. Noble, C.B.E., B.Sc.Agr., M.Sc., Ph.D., Under Secretary and Director, retired on 16th May, 1959, in his 47th year of service and his 20th year as Permanent Head.

In April, 1913, as an undergraduate, he joined the Department as a Scientific Cadet; and in 1920 was appointed Assistant Biologist. In 1923 he was promoted to Principal Assistant Biologist and in 1927 to Biologist. On 1st April, 1940, he was appointed Under Secretary and Director, Permanent Head of the Department, and from September, 1940, was also Chief of the Division of Science Services.

During 1940, Dr. Noble re-organised the advisory, investigational and regulatory services on a Divisional basis; accordingly—the Divisions of Plant Industry, Horticulture, Animal Industry, Dairying, Science Services, Marketing (later—"Marketing and Agricultural Economics"), and Information & Extension Services (later—"Information Services").

New establishments during Dr. Noble's career as Permanent Head included the Animal Nutrition Laboratory, Glenfield; the Wagga Agricultural College; the Agricultural Research Institute, Wagga; the Wool Research Laboratory at Trangie Experiment Station; the Tamworth Agricultural Experiment Station; Lower Murray Research Station; Gosford Citrus Experiment Station; Alstonville Tropical Fruit Research Station, and Narrabri Experiment Farm. Erection of Science Service Laboratories at Rydalmere also commenced. Other new administrative establishments included the Experiment Farms & Stations Branch, and the Regional Extension Services.

Intra- and inter-Departmental and external gatherings marking Dr. Noble's retirement paid deserving tributes to his administration, leadership, and scientific contributions to agriculture.



"Fare Well' Dr. Noble"

On 15th May, 1959, final day of service, Dr. R. J. Noble, C.B.E., for nineteen years Under Secretary and Director of the Department, and Chief of the Division of Science Services, was farewelled by colleagues and officers of the Department of Agriculture and allied services. On his right (seated)—Mrs. Noble. On his left (seated)—the Minister for Agriculture, the Chairman of the Public Service Board, the Chairman of the Meat Industry Board.

(Photo—Division of Information Services)

Central Administrative Positions

Former Assistant Under Secretary Mr. E. O. Tout, now Under Secretary, succeeded Dr. Noble as Permanent Head; as from 17th May, 1959.

Mr. Graham Edgar, formerly Director of Veterinary Research, was appointed Assistant Under Secretary; and Dr. H. J. Hynes, formerly Assistant Director of the Department, was re-designated as Director.

Production Trends

Rural production was in general much higher than in the previous year when dry conditions were widespread.

Good general rain in August and September, 1958, relieved the unfavourable pastoral position. Good follow-up falls in the 1958-59 summer further improved the position; with the result that pastures provided very good feed and crop yields were mainly well above average.

With the coming of mild dry weather in the 1959 autumn, pastures deteriorated slightly but still carried satisfactory feed except in the Western Division and parts of the Riverina.

At the end of 1958-59, pastures were generally satisfactory, stock were in good condition, and water supplies were adequate. Nevertheless, general rain was again needed in most areas to ensure satisfactory spring and summer growth of pastures and crops.

At the end of March, 1959, sheep numbers in New South Wales were the highest on record—67.94 million head; an increase of about 2.52 million from the figure of the previous year, and 0.27 million greater than the previous record—67.67 million head in 1956-57. The wool cut per head was considerably higher than that of 1957-58. Lambing percentages were also above average in most districts.

Cattle numbers declined slightly; from 3.736 million head at the end of March, 1958, to 3.684 million in March, 1959. This decrease of 52,000 comprised 27,000 head of beef cattle and 25,000 head of dairy stock.

Livestock slaughterings were higher than in 1957-58, but while beef production showed an increase there was a slight decrease in output of veal. Slaughtering of sheep and lambs, and production of sheep meats, increased.

State butter production for 1958-59 was 37,739 tons, 26 per cent. higher than in 1957-58; while production of cheese was 5,034 tons, 25 per cent. greater than last year.

Egg production showed a further slight decline during the year, due mainly to the high level of domestic wheat prices in 1958.

In contrast to the previous year, seasonal conditions for cereals were excellent in 1958-59. The wheat harvest was 66.44 million bushels, the average yield being 20.9 bushels per acre. Production of wheaten hay was approximately 158,000 tons.

The price of wheat for local consumption returned to the normal level on 1st December, 1958, when the special loading imposed earlier in 1958 to meet freight costs on imported wheat was removed.

Adequate supplies of wheat have been available to local users since December, 1958, and a fairly heavy carry-over at the end of the 1958-59 crop year is anticipated. Prospects at the end of June were for another heavy wheat crop in 1959.

Maize yields were generally good and in some districts the harvest was the best for years.

The area sown to oats and the yield of oaten grain in 1958-59 were records. Of 1,627,000 acres sown for all purposes, 1,130,000 acres were utilised for grain, 117,000 acres for hay and 380,000 acres for green fodder. The phenomenal oat grain harvest of 27.64 million bushels was well above the previous record of 16.50 million bushels in 1955-56; while the hay yield of 172,000 tons was the highest for over ten years.

Barley also experienced an excellent season, the harvest of 2.92 million bushels being almost three times as great as the previous record grain yield of 1.12 million bushels in 1955-56.

Rice production reached 124,000 tons, 17 per cent. greater than last year's record harvest of 106,000 tons; yields increased from 2.31 tons per acre in 1957-58 to 2.39 tons per acre in 1958-59.

Citrus fruit production was 3.284 million bushels, slightly lower than in 1957-58. Severe frosts at the beginning of 1958-59 caused considerable damage to trees in the principal inland areas. However, a heavy 1959 citrus harvest is anticipated.

Ample supplies of most feedstuffs were available throughout the year; although, as the result of the failure of the 1957-58 wheat crop, wheat supplies were rationed in the early part of the period. Ample supplies were available following the commencement of the 1958 wheat harvest.

The supply of pollard and bran, meat meal and most other high protein concentrates was such that appreciable export surpluses were available from time to time. The position in regard to feed supplies was more satisfactory than for many years.

Expenditure—Summary

Payments from Consolidated Revenue Fund relating to investigational, education and associated administrative activities totalled £2,369,079. Receipts from sales of farm produce, and from fees and other miscellaneous revenue, totalling £640,081, reduced the net cost of these services to £1,728,998.

Cattle tick eradication and control cost £1,079,336 (net) after allowing for stock dipping fees and other minor items of revenue totalling £9,489. The Commonwealth Government has contributed £578,018 towards the campaign costs, leaving £501,318 to be borne by New South Wales.

The Royal Botanic Gardens and allied activities accounted for a further sum of £121,738, offset by receipts totalling £10,081, leaving a net cost of £111,657 to the Consolidated Revenue Fund.

Buildings and improvements of a permanent nature to a total cost of £71,097 were constructed. This was provided by the Treasury from loan funds.

Details of the Accounts of the Department, including numerous Special Deposits Accounts, opened with the Treasury in terms of the Special Deposits Account Act of 1911, are presented in the Appendix I.

Capital Works

The Department has in hand, for completion in 1959-60, capital works such as buildings, water supply, stock yards, etc., estimated to cost £120,000.

In addition to the works in hand, many improvements are essential at the Agricultural Colleges and at the Experiment Farms and Stations, by way of buildings, water supply, fencing, etc., in the interests of the research and education needed for the well-being and development of the rural industries.

Commonwealth Agricultural Extension Grant

The Commonwealth has announced that this Grant, to enhance extension services and their effect, will continue until 30th June, 1965. Since the inception of the Grant in 1952-53, N.S.W. has received amounts varying from £50,000 to £75,000 per annum. As from 1st July, 1960, the total Grant to the States will be £300,000 per annum, and N.S.W. will receive £75,000 per annum from the total.

More detail, of the effects of the Commonwealth Agricultural Extension Grant, is provided in later sections of this report.

Commonwealth Dairy Industry Extension Grant

This Grant, from which £64,880 per annum is received by N.S.W. to enhance extension services and their effect on the dairy industry, will continue to 30th June, 1963, when it may be renewed for a further period.

More detail, of the effects of this Grant, is provided in later sections of this report.

Bush Fire and Flood Relief

There was no major bush fire or flood during the financial year 1958-59. This Department as agent for the Bush Fire and Flood Relief Committee was only called on to pay claims totalling £4,540, carried over from the previous year.

Swine and Cattle Compensation Funds

A downward trend in claims against the Swine Compensation Fund was evident in 1957-58 and continued throughout 1958-59.

On the other hand, claims against the Cattle Compensation Fund have shown a slight increase over the previous financial year; a direct result of the accelerated campaign to eradicate certain specified diseases.

The amount levied for Swine and Cattle Compensation is kept under close scrutiny by the Department, so that the charge on the industry may be reduced as soon as the level of compensation claims shows signs of permanent reduction.

Country Abattoirs

The four large-scale abattoirs, operated by the respective City and Municipal Councils, at Goulburn, Wagga, Dubbo and Gunnedah, had a very good year—in regard to numbers of stock slaughtered, and financially.

The Government provided practically the whole of the finance for the construction of these abattoirs and in each case their half-yearly repayments have been met. The first commenced operations in May, 1951, at Goulburn.

An Inter-Departmental Country Abattoir Committee, comprising representatives from the Departments of Agriculture and Local Government, was set up in May, 1958, to investigate and report on all aspects of centralised killing in country areas. It has continued its survey this year. The survey is expected to be completed towards the end of 1959.

Meat Inspection Service

Inspectors of the Meat Inspection Service were stationed at the State Abattoir, two privately owned abattoirs and six slaughterhouses, within the Metropolitan Abattoir Area, and at 17 abattoirs and bacon factories in country areas.

At the country abattoirs the Meat Inspectors inspected meat intended for introduction into the Metropolitan Abattoir Area and also meat for local district consumption. The inspection of meat for introduction into the Abattoir Area was carried out at 11 country abattoirs and bacon factories by Meat Inspectors approved by the Minister and employed by the local councils or the Commonwealth.

The number of cattle and sheep slaughtered and inspected at the State Abattoir and country abattoirs increased substantially during the year. This increase was due in part to increased export of boned meat but the kill for the Metropolitan Abattoir Area also rose steeply at most abattoirs.

The Meat Inspection Services are reported in considerable detail under "Division of Animal Industry" in this report.

Erection of Science Service Laboratories, Rydalmere

The proposal to transfer the Biological Branch, Chemist Branch and Entomological Branch of the Division of Science Services to new laboratories to be erected at Rydalmere took form during the year.

Plans were completed and a contract for erection of the Laboratories at a cost of £381,000 was signed during April.

The Foundation Stone of the new Laboratories was set by the Hon. Roger B. Nott, Minister for Agriculture, on 7th May, 1959, on a seven acre site fronting Victoria Avenue, Rydalmere. The Laboratories may be ready for occupation in March, 1960.

Narrabri Experiment Farm Established

The Narrabri Experiment Farm is now fully functioning as a research centre to obtain information on various crops and pastures; for the benefit of potential irrigation farmers in the north-west, and for guidance of the Water Conservation and Irrigation Commission in determining farm size when the Keepit Dam waters become available.

The sum of £29,500 from Loan Funds has been spent on establishment of the property. It comprises an area of approximately 204 acres. A Manager's residence, and quarters for unmarried staff, have been erected; as well as a large Machinery Shed and an administrative building in which is incorporated an Agronomy Shed.

The first crops were sown in the Spring of 1958 and it is already clear that the production of cotton on a commercial scale is very promising.

In addition to cotton and other summer crops, comprehensive pasture sowings for trial purposes were sown in the Autumn of 1959.

United Nations Food and Agricultural Organisation

The State F.A.O. Committee continued to maintain close liaison with the National F.A.O. Committee and, through that Committee, with the headquarters of the United Nations Food and Agriculture Organisation in Rome.

The State F.A.O. Committee and the Department continued to support F.A.O.'s Expanded Programme of Technical Assistance to under-developed countries. Several Departmental and former officers were active in the programme. The Department also assisted in training agricultural students and government officers from various Asian countries.

Australian Agricultural Council, and Standing Committee on Agriculture

Four meetings of the Australian Agricultural Council were held; two at Sydney, in July and August, 1958; one at Melbourne, in October, 1958; and one at Perth, in February, 1959. Two meetings of the Standing Committee on Agriculture were held, in conjunction with the Melbourne and Perth meetings of Council.

Wheat Stabilisation Scheme

Legislation was enacted during the year to implement a new Stabilisation Plan which had been agreed to by the Governments of all States and the Commonwealth. The new plan covers the five seasons 1958/59 to 1963/64, and thus provides for the continuation of a stabilised return to the wheatgrower.

It provides for a basic local price of 14s. 8d. per bushel, bulk basis Sydney and other principal ports (this includes a loading of 2d. per bushel to cover the cost of shipping wheat to Tasmania).

As in previous schemes the Commonwealth Government guarantees growers a return equal to cost of production—14s. 6d. in the 1958-59 season—for up to 100 million bushels of export wheat in each of the five seasons during which the scheme operates.

A new International Wheat Agreement also became operative during the year.

Farrer Memorial Trust

The Trustees of the Farrer Memorial Research Scholarship Fund held the Annual and also three ordinary meetings.

The Annual Farrer Memorial Oration for 1958 was delivered by Dr. I. A. Watson, B.Sc.Agr., Ph.D. (Minn.), Associate Professor of Genetics and Plant Breeding, School of Agriculture, University of Sydney, during a special session of the Agricultural Bureau State Congress at Hawkesbury Agricultural College on 15th July, 1958.

Subject of the Oration was "The Present Status of Breeding Disease Resistant Wheat in Australia". The text was subsequently published in the *Agricultural Gazette of N.S.W.*

Dr. Watson was presented with the 1958 Farrer Memorial Medal in recognition of his distinguished service in agricultural science.

The Wheat Industry Research Committee of N.S.W. has agreed to provide £1,000 per annum for a Farrer Memorial Research Scholarship devoted to wheat research. This will enable the Trustees to award a scholarship in 1959 and at regular intervals thereafter.

Accounts of the Trust have been audited by the N.S.W. Auditor-General who has indicated that the result of the audit is satisfactory.

Dr. R. J. Noble, former Chairman, retired on 16th May, 1959.

Mr. E. O. Tout, Under Secretary, N.S.W. Department of Agriculture, was subsequently elected as Chairman of the Trust.



"Change"

Much of what was familiar in the Macquarie Street and Figtree Avenue fringes of Sydney's Royal Botanic Gardens and the Domain has undergone drastic treatment in the course of improving highway communications and subsequent new landscaping. Details are set out in the "Botanic Gardens, National Herbarium, and Allied Services" section of this Report.

(Photo—Division of Information Services)

Botanic Gardens and Sydney Domain Trust

Two meetings of the Trustees of the Royal Botanic Gardens and Government Domain were held.

Among the matters discussed were requests for an area of Domain land adjacent to Parliament House grounds for parking of cars on the Parliamentary List; the establishment of a helicopter landing ground in the Royal Botanic Gardens adjacent to Macquarie Street; the construction of the Cahill Expressway through the Gardens and Domain; car parking on Domain roadways; transfer of tenancy of the Royal Botanic Gardens Kiosk; and construction of a bowling green above the car parking station in the Domain.

New regulations under the Crown Lands Consolidation Act, 1913, as amended, relating to the Royal Botanic Gardens and Government Domain, were published in the Government Gazette of 1st May, 1959, replacing the by-laws under the Public Parks Act.

Her Majesty the Queen approved, in January, 1959, of the Botanic Gardens being re-designated the "Royal Botanic Gardens, Sydney".

Agricultural Education

The total student enrolment at Hawkesbury Agricultural College was 237 at the beginning of the first session in February, 1959, and 94 were at Wagga Agricultural College. There continues to be a heavy demand for enrolment at both Colleges.

The numbers of short term schools at both Hawkesbury and Wagga Agricultural Colleges continue on a high level. Schools were conducted in Poultry Farming, Youth Leadership, Tractor Maintenance, Beekeeping and Turkey Raising. Schools were also held for dairy factory apprentices, junior farmers, and University of Sydney Second Year Agricultural Students.

The two Agricultural Colleges are respectively reported in detail in a later section of this report.

Agricultural Regions

On 5th December, 1958, the last of the nine Regions to be formed was inaugurated at Gunnedah by the Minister for Agriculture. This Region is known as the North Western Region. It completes the existing programme.

An area centred on Sydney and extending to Gosford in the north, to Penrith in the west, and to Picton in the south, is not within a "Region". The officers in this area are mainly located at Gosford, Parramatta and Camden. They are administered largely from head office.

There is more detail of the "Agricultural Regions" programme and achievements in the Regional Extension Services section of this report.

Cattle Tick Eradication

The cattle tick Eradication campaign was successful in Cullendore and Bookookoorara areas, and these sections have now been released from quarantine restrictions.

The major portion of Cheviot has been found clean, and, other than a small section now undergoing a further eradication programme, the Cheviot area has similarly been released.

The Boonoo Boonoo area programme is proceeding satisfactorily, and the dipping and inspection phases have been completed. If no cattle tick is detected during the surveillance period, this area also will be classified as "clean" country.

Further infestations have been detected in the Southern Tabulam and Southern Rivertree areas, and these sections have reverted to a Control programme.

During inspections in the Copmanhurst area, further infestations have been found on both sides of the Clarence River and in the northern and southern extremities. Accordingly, Copmanhurst has now been placed under a control policy.

The position in the Grafton area has remained static. No fresh infestation has been detected.

In both Grafton and Copmanhurst, provision has been made for strategic dips to be charged with DDT—to enable stock moving to clean country to be treated with this acaricide rather than arsenic.

It is disturbing but not unexpected to note the spread of arsenic-resistant ticks in the Richmond and Tweed areas. There are now 115 dips charged with DDT in the Richmond and Tweed areas, to deal with infestations and to treat stock moving to clean country. Tick Fever outbreaks have increased in these areas, but have been brought under control rapidly.

Animal Diseases

Some of the notable occurrences were the diagnosis of Eperythrozoonosis in sheep, the extensive outbreak of Infectious Virus Diarrhoea, previously referred to as Winter Dysentery, the marked increase in incidence of Avian Monocytosis, a severe outbreak of Swine Pox in north coast areas, and the extent of neonatal losses in lambs.

Each of the foregoing developments and others are subject to more detail in the Division of Animal Industry section of this report of the Department.

Merino Poll Gene Deleterious

Investigations at Trangie Station to date indicate that the poll gene in Merinos is deleterious to production of wool and depresses fertility.

There is more detail in the Division of Animal Industry section of this report.

Beef Cattle Improvement

Much interest has been focussed on the Department's work aimed at beef cattle improvement based on selection of breeding stock, both male and female, through the performance of their progeny. This work, commenced in 1956 on two private properties in the Bombala district of New South Wales and later extended to two other private properties and to studs and herds owned by the Department, is yielding encouraging results.

In the subject herds, calves are weighed and identified at birth, weighed and graded for type at weaning and at later specific ages; and from the results obtained the breeding qualities of their parents are assessed. On the basis of this work, selection and culling of the breeding stock are carried out.

Already, much important data have been collected, and two science papers on the findings have been published.

This improvement scheme is expected to be the forerunner of a more extensive State-wide programme, and to have a profound bearing on beef production.

There is more detail of the work in the Division of Animal Industry section of this report.

Poultry Improvement Plan

A breeding scheme implemented by the Department under the Commonwealth Agricultural Extension Services Grant has proved one of the greatest innovations for industry welfare.

Breeding of improved strains of poultry has formerly been a neglected aspect of the industry. This can be regarded as the main reason for lack of improvement in the egg production average of local strains of poultry. Poultry breeding improvement work is essentially a long-term project and spectacularly fast results cannot be expected. However, 22 breeders, representing an important section of the poultry industry, are co-operating with the Department and following the principles of sire family selection to improve local strains.

Foundation stock has been made available to the industry from the Poultry Experiment Station, Seven Hills, where the principle of recurrent reciprocal selection has been practised. It is proposed to speed up the breeding work at the Station and follow a system of breeding based on individual and family merit.

A complete demonstration breeding unit is in operation at Hawkesbury Agricultural College, and an increased production average has been obtained from the first generation.

Random sample testing is also conducted at the College, to measure the rate of improvement among the breeders accredited under the scheme. Another test which has been in operation for eight years is the testing of stock similar to that being sold to the commercial producer for laying flock replacements.

A significant outcome of the Poultry Improvement Plan is the fact that scientific breeding has been accepted by the industry as essential for greater efficiency, and has influenced a competitive drive by breeders to improve commercial strains of poultry in this State.

World Poultry Science Congress

Two officers of the Department attended the XIth World Poultry Science Congress, at Mexico City, and several poultry industry representatives who were also members of the World Poultry Science Association attended to form a delegation led by the Agricultural Attache, Australian Embassy, Washington, U.S.A.

An invitation extended by the Commonwealth Government was accepted by the councillors of the Association, for the XIIth Congress to be held in Sydney during August, 1962.

Livestock Successes at 1959 R.A.S. Show

The Department of Agriculture exhibited specimens of its stud stock at the New South Wales Royal Agricultural Society Show, Sydney, acknowledged as one of the leading agricultural exhibitions in the world.

From the Department's Trangie stud the first progeny of the Angus bull "Pro Ben of Balfroon" (imp.) was exhibited. Two of these bulls were placed in their Class. All six bulls exhibited were sold by auction, for an average of 326 guineas and a top price of 650 guineas.

The Department's mare "Thalia" won the Arab mare championship and the Wentworth Memorial Trophy for the best Arab female. Other awards received were one first and three second prizes.

The Saanen goats were outstandingly successful. They won all three championships, two of the three reserve championships, all three special prizes and thirteen first prizes, in addition to many lesser prizes. In all, the team of goats from the Saanen stud at Condobolin Experiment Farm won about 75 per cent. of all prizes for the Goat Section at the 1959 Sydney Royal Show.

In the Dairy Cattle section, teams from the Department's Stud Dairy Herds secured fifteen first, twelve second and ten third prizes. Progeny of sires purchased overseas by the Department's 1955 Stock Buying Delegation secured a number of major awards.

The Guernsey Exhibit from Yanco Experiment Farm was judged "Most Successful Exhibitor" in the Guernsey Section.

In the "Type and Production Classes" section, outstanding production performances enabled individual animals to secure a number of awards. Wagga Agricultural College and Experiment Station exhibits gained six trophies in the Jersey Herd Society's Lactation Competition.

Milking Machine Survey

The Department has had a Research Officer specialising in milking machine research for nearly three years. Stationed at Hawkesbury Agricultural College, his first task consisted of conducting a small survey of milking machine efficiency throughout the main dairying districts of the State.

This survey confirmed that there was considerable room for improvement in milking machine operation.

In the course of seven months, about 125 machines were tested, and about 1,200 dairy farmers were addressed on the need for the correct adjustment, operation and maintenance of their machines.

So great was the need and so widespread was the interest that it was decided to institute a State-wide survey, under the Dairy Industry Extension Grant; to demonstrate to farmers the sources of the inefficiency of their machines, the effects of inefficiency in lower production, in slowing milking, and in inducing mastitis, and the benefits of maintaining and using their machines correctly.

The State-wide survey was instituted two years ago with the appointment and training of two Survey Officers, followed later by a third; and it is performing a very useful function in gradually raising the standard of milking machine operations.

Several lines of inquiry for the Research Officer have been suggested by the survey.

There is more detail in the Division of Dairying section of this report.

Milking Machine Research in Co-operation with Animal Husbandry Department of University of Sydney

In recent discussions, it has been agreed that the Dairy Research Officer at Hawkesbury Agricultural College shall work in with the fundamental line of approach of the University of Sydney. Some of the problems for the common attack are:—

- The chemistry of removal of tinning by acid and alkali detergents, and its application to prevention of copper contamination of milk in the milking machine.
- The development of standards of performance of milking machine components such as pulsators, regulators, releasers, etc.
- Determination of the mechanism of mastitis infection in cows, and of the factors of milking machine operation predisposing to it.
- Evaluation of the factors affecting milking rate, amount of strippings, teat cup crawl, and their relationship to short lactations.
- Field trials of new-type sanitizing agents, circulation cleaning systems, etc
- The development of an improved milk recorder and/or milk flow indicator.
- Improved methods of milk cooling, water heating, milk transport and storage.

Actually, some work has been done on several of the projects, viz:—the chemistry of removal of tinning by acid; development of standards of performance of milking machines; field trials of circulation systems.

Cotton Success in the North-West

At the newly-established Narrabri Experiment Farm, the Department has begun intensive research and investigation in relation to cotton; in part because of the water which will be made available for irrigation purposes within the next few years from Keepit Dam.

Despite a very unfavourable season in 1958-59, most encouraging results attended cotton trials. As much as 1,700 lb. per acre was obtained from cotton crops grown under irrigation at the Experiment Farm.

Some £A6,000,000 worth of raw cotton is imported into Australia annually and, in addition, some £A42,000,000 worth of imported cotton piecegoods are needed to satisfy Australia's requirements. The cotton spinning industry in Australia uses between 80 and 90 thousand bales of raw cotton annually and, of this, only about 3,000 bales are produced locally—all grown in Queensland.

The average yield of seed cotton in Queensland over thirteen years is only 363 lb. per acre. In America, under irrigation, annual yields of between 2,000 and 3,000 lb. of seed cotton per acre are obtained.

Since the plots at Narrabri Experiment Farm in the first season have yielded up to 1,700 lb. seed cotton per acre, this, though not high, is very encouraging. There were difficulties, not anticipated, that will be overcome next year.

Tobacco Breeding Success

The Department has achieved outstanding success in the production of blue mould-resistant tobaccos. Growers and manufacturers have expressed their appreciation of the speed and effectiveness of the breeding programme for blue mould resistance.

The results achieved will have a big effect throughout Australia in raising the quantity and quality of tobacco produced; since blue mould has been perhaps the greatest single factor in reducing returns and making the industry unattractive.

Distribution of the blue mould-resistant varieties within the next year or two will return an immense dividend on the £10,000 allocation from Tobacco Industry Research Funds for the New South Wales programme of breeding for resistance to blue mould.

Wheat Production

Australian Wheat Board receivals of wheat from this State's 1958-59 harvest totalled some 59,670,000 bushels, compared to 4,100,000 bushels the previous year.

Adding to this figure the quantity of grain held back by farmers to satisfy 1960 sowings and stock feed requirements, the Commonwealth Statistician estimated that the N.S.W. harvest totalled some 66,000,000 bushels—from 3,100,000 acres sown for grain; a yield average of 21.3 bushels per acre. That per acre yield average would be a record for this State.

Progress of New Wheat Varieties

Durum Wheat.—Production of Dural, the new durum wheat variety bred by plant breeders of this Department, is expanding; and the interest of a firm of flour millers located in the north-west, and a large firm of food processors with headquarters in Melbourne, has ensured that within a year or two sufficient Dural will be grown to meet the spaghetti manufacturing purposes of at least the processing firm concerned.

Winter Wheat.—Production of winter wheats, particularly in the north-west, has received considerable impetus by the advance of the new variety Winglen into commercial cultivation.

Winglen was produced under the combined University of Sydney-Department of Agriculture northern breeding programme. Enough seed of Winglen to satisfy all demands is not yet available; but pure seed production was commenced in 1958. It seems certain that cultivation of this type of wheat, which can be sown very early in the season, will greatly expand.

Wheat Grading on Quality

The Wheat Industry Research Council allocated £4,000 to the Department to investigate the proposition of grading wheat on the basis of quality at points of receipt. The work commenced during the 1958 harvest.

Approximately 4,000 samples of wheat were taken for the Chemist Branch at various receiving points throughout the State. The samples are being analysed to determine whether quality characteristics can be positively correlated with any physical character that would be easily recognisable at country grain elevators.

At the time of sampling, information was sought from each farmer concerned. This will be applied in the interpretation of results of chemical data.

Water Testing Service

Demand on water testing services in the Chemist Branch continued at a high level; 1,200 samples of water were analysed and advice was given as to their suitability for stock and irrigation use.

A Prototype Salinity Meter for Field Use.—For use in the field by farmers, orchardists, extension officers, etc., a prototype meter was produced. Negotiations are proceeding with a manufacturer re production and distribution of the field meter.

Conductivity Meter for each Regional Office.—From monies made available from the Dairy Industry Extension Grant and the Agricultural Extension Grant, conductivity meters were purchased, one for each of the nine Agricultural Regions.

Programme of Pastures Investigations—"U.P.S.E.T."

"U.P.S.E.T." is derived from the name given to a major new Plant Industry Division project—"Uniform Pasture Survey Extension Trials".

To evaluate the various findings of research done by various organisations over the past ten years, in terms of application of the findings to the varied soil and climatic conditions in New South Wales, a series of uniform trials has been designed. The trials incorporate the various fertilizer treatments, methods and species suggested by research, together with suitable comparatives.

Development of these experiments on a uniform basis has made possible the bulk acquisition and multiple packaging of the requisites. It has also simplified the work of each field officer in establishing the trials in his area, and streamlined the collection of data. Co-ordination of the results overall will be correspondingly simplified.

Seven separate replicated experiments are involved; and, in "kits" involving some 10,000 packets of seed and fertilizer, were centrally packaged and distributed.

The project will enable the formulation of more precise recommendations for a great part of the State; and will indicate areas and problems of pasture establishment not met by existing knowledge.

Hunter Valley Pastures Research Committee

The year 1958-59 saw the beginning of a new era in pasture research in the Mid-Coast and Hunter region, with formation of a Hunter Valley Pasture Research Committee.

This Committee was formed for the general direction of pasture research in the area; the research to be carried out co-operatively by the Department of Agriculture, the Hunter Valley Co-operative Dairy Company Ltd., the Sulphide Corporation Pty. Ltd. and Australian Fertilizers Ltd.

The Hunter Valley Co-operative Dairy Co. Ltd. is providing materials and casual labour requirements to a value not exceeding £1,000 per annum for an initial five-year period, while the two fertilizer companies will each contribute £750 per annum for five years. The Department is providing a research agronomist, and technical assistance when required from other sections of the Department, together with office and laboratory facilities. The initial work programme has commenced.

Serrated Tussock

On the central tablelands about 3,000 acres of infested country has been top-dressed and seeded from the air as the first step in a large-scale control programme. This development reflects close collaboration between the Department and the Upper Macquarie County Council, and farmers' confidence in the research programme.

The research gives promise of control by over-seeding plus careful management, but the process will be slow and grazing will have to be severely restricted during the early stages. It is becoming clear also that steep areas can be treated, by ploughing with crawler tractors and chisel ploughs.

Demonstrations established in recent years have shown that proper land preparation for pasture, associated with efficient pasture management, gives excellent control of serrated tussock as well as yielding high pasture production. Insufficient land preparation and/or over-grazing soon opens up the pasture for reinfestation.

Rabbit Control Programme

Use of Sodium fluoroacetate (1080) as a rabbit poison is being actively encouraged in New South Wales; but its release in any Pastures Protection District will only be approved when a field officer of the respective Pastures Protection Board has been trained in its use.

A series of Training Schools has been arranged. It is hoped that training needs for the whole State will be covered in a reasonably short period.

Legal and Registration Branch

ACTS PASSED

Wheat Industry Stabilization Act, 1958.—A further stabilization plan, to operate for a period of five years commencing with the 1958-59 wheat season, was agreed to between the Commonwealth and the States and was accepted by wheat-growers throughout the Commonwealth.

This Act implemented the scheme, in conjunction with similar legislation enacted by the Commonwealth and the other States.

The legislation follows closely the lines of the legislation which operated in respect of previous schemes; and provides for the marketing of all wheat of the seasons from 1958-59 to 1963-64 through the Australian Wheat Board, on the basis of an equality of return to the grower. There is a guaranteed price for all such wheat whether sold for home consumption or for export. The guaranteed price is at least the cost of production, as assessed under an agreed formula.

Meat Industry (Amendment) Act, 1958.—This Act enabled the Chairman of the Metropolitan Meat Industry Board to continue in office for a period of two years after he attained the normal retiring age of 65 years in March, 1959.

REGULATIONS, PROCLAMATIONS

There were 24 Gazettals of Regulations, 60 Proclamations, and 85 Notifications.

The Regulations for control and management of the Royal Botanic Gardens were revised and re-Gazetted in a consolidated form.

New Regulations were Gazetted under the Cattle Slaughtering and Diseased Animals and Meat Act regulating the sale of meat and smallgoods in the Lake Macquarie and Port Stephens Shires; in consequence of the Newcastle and Maitland Abattoirs becoming Central Abattoirs for those Shires.

PROSECUTIONS

For offences under the various Acts administered by the Department, 173 persons were prosecuted.

ARBITRATION—AGRICULTURAL HOLDINGS ACT, 1941

Six disputes were dealt with by Agricultural Committees constituted under the Act. These included two cases adjourned from the previous year for statement of cases to the District Court on questions of law.

In four cases, claims by tenants for compensation for general improvements were made. The other two were claims for compensation for the specific improvement of establishing a banana plantation.

Awards were made for sums of £1,800, £652, £303 and £120. In three cases questions of law were submitted for the opinion of the District Court.

REGISTRATIONS

Registrations effected during 1957-58 and those of 1959-60 are compared below:—

	1957-58	1959-60
Apiary registration	3,666	3,880
Potato licences	1,617	1,740
Stock foods	1,063	1,169
Stock medicines	1,550	1,650
Pest destroyers	1,385	1,349
Sheep brands	2,000	1,685
Sheep earmarks	2,157	1,926
Large stock brands	1,574	1,559
Fertilizers	487	630
Farm produce agents	306	311
Veterinary surgeons	412	411
Swine brands	1,354	607
Swine licences	60	28

Veterinary Surgeons Board

The Board met on only eight occasions; because the position of Registrar again became vacant during the year.

The prescribed examination for veterinary graduates of overseas universities was held in September, 1958. One candidate was successful and four failed.

The Board has under consideration recommendations to be made to the Minister, for the amendment of the Veterinary Surgeons Act, 1923-1957, to regulate the conditions under which unqualified persons may be employed by registered veterinary surgeons.

Personnel Branch

Advice to Personnel.—The Personnel Branch continued to furnish advice and guidance to members of the staff on educational matters, career prospects, and personal problems.

The Personnel Officer attended the biennial Conference of District Agronomists held at Hawkesbury Agricultural College. He also visited Departmental offices and institutions in the North Coast, Northern, Western, Southern and South-Western Agricultural Regions. Officers of the Branch continue to visit as many centres as possible, for personal contact with country officers.

Liaison with P.S.B. Examination Branch.—This was mainly concerned with examination papers for officers and employees required to take "in-service" examinations.

Tutorial Service.—Tutorial assistance was organised for clerical officers preparing for the examinations under P.S.B. Regulations 116 and 119.

First Aid Service.—The Matron and First Aid Officer provided service in 318 cases of minor indisposition or disability (137 male; 181 female).

Trainee/Cadet System.—Twenty-two trainees (University) and cadets (Agricultural College) completed their studies in 1958 and were appointed to positions in the Department. Twenty-three new trainees and cadets were appointed in 1959, bringing the number at present undertaking courses to sixty-four; excluding two under suspension for the current academic year.

Advice was furnished to a large number of students and parents regarding the availability of traineeships and cadetships, and regarding employment generally.

Brochure for Newly-appointed Staff.—This brochure was revised and is now with the Government Printer for reprinting.

Manual of General Information for Officers.—This Manual has been revised and forwarded to the Government Printer.

Substantial progress has been made with the revision of the notes on the relationship of the Department of Agriculture to other organisations and Government Departments.

Training for Visitors from Asian Countries.—The Branch continued to be associated with the training of students under the Colombo Plan and the Food and Agricultural Organisation. Facilities were made available to students from Pakistan, Indonesia, Malaya, Burma, Ceylon, the Philippines, Korea and Taiwan.

Staff Section

Appointments.—Messrs. W. B. Tredinnick, Veterinary Officer; W. P. C. Richards, Veterinary Officer; C. D. Blake, Plant Pathologist; B. J. Bridge, Agronomist; E. M. Reed, Entomologist; R. G. Beilharz, Livestock Officer; P. A. McInnes, Livestock Officer; R. F. Komoll, Agronomist; R. B. Bate, Livestock Officer; D. G. Slennett, Livestock Officer; M. J. E. Squire, Assistant Principal Agronomist; E. C. Powell, Assistant Principal Agronomist; D. C. Hosking, Agronomist; R. J. Roughley, Bacteriologist; J. A. Pearman, Plant Pathologist; J. A. Holbeche, Special Fruit Officer; R. W. McLeod, Bacteriologist; E. A. Christenson, Agronomist; L. S. Dykes, Dairy Officer; L. A. Isaac, Dairy Officer; D. N. Jamieson, Extension Officer (Radio Services); F. F. Von Mengersen, Agronomist; V. J. Baxter, Veterinary Officer; R. B. Bonnor, Veterinary Officer; M. D. Wheeler, Livestock Officer; W. McCarroll, Deputy Principal, Hawkesbury Agricultural College; K. H. Davey, Cereal Technician; W. P. C. Richards, Veterinary Officer; A. Dowey, Lecturer; P. T. Gilchrist, Veterinary Officer; W. E. Lawrence, Veterinary Research Officer; G. W. A. Sparrow, Analyst; R. A. B. Gilbert, Agronomist; P. C. Williams, Research Officer; F. B. Donnelly, Livestock Officer; C. J. P. Magee, Chief, Division of Science Services and Chief Biologist; F. H. G. Gruen, Special Economics Research Officer; E. S. Blanch, Analyst; D. A. Dickinson, District Veterinary Officer; G. J. Skillman, Assistant Principal Veterinary Officer; R. J. Cotsell, Livestock Officer; W. R. Watson, Assistant Superintendent, Royal Botanic Gardens; A. C. Small, Chief, Division of Dairying; R. R. Storrier, Analyst; H. J. Willetts, Plant Pathologist; L. G. Barnett, Dairy Officer; H. F. Nardin, Analyst; D. E. Finlay, Fruit Officer; A. C. Taylor, Research Officer; T. O'Byrne, Analyst; E. O. Tout, Under Secretary and Permanent Head; H. J. Hynes, Director of Agriculture; W. S. Noble, Inspector under the Factories and Shops Act; G. Edgar, Assistant Under Secretary; K. A. Russell, Assistant Accountant; R. J. Cooper, Livestock Officer; K. R. McKenzie, Livestock Officer; R. R. Schulze, Agronomist; J. B. Wilson, Agronomist; L. D. Beeby, Livestock Officer; J. A. Seberry, Fruit Officer; M. J. Gaven, Entomologist; B. J. Restall, Livestock Officer; R. J. Beck, Livestock Officer; P. C. Boxwell, Fruit Officer; I. S. Embury, Livestock Officer.

Retirements.—E. E. Willis, Inspector, Plant Diseases Act; A. C. Clifton, Superintendent, Griffith Viticultural Nursery; W. A. G. Wood, Architect; J. Cowhan, Inspector, Plant Diseases Act; C. W. Wearne, Chief Clerk; A. L. Astbury, Senior Dairy Officer; R. J. Noble, Under Secretary and Director and Permanent Head.

Deaths.—E. H. Headley, Principal Dairy Officer (24th February, 1959); C. A. E. Kiel, Assistant Accountant (21st August, 1958); R. E. Talbot, Inspector, various Acts (21st October, 1958).

Departed for Overseas.—Mr. J. C. Keast, Senior Veterinary Research Officer—to attend the International Veterinary Congress in Madrid and subsequently visit a number of research centres in the United Kingdom and the United States of America.

Mr. F. G. Swain, Agronomist—to take up an Assistantship at the University of Maryland, U.S.A.

Mr. R. J. Richards, Bacteriologist—to take up a Research Assistantship at the Ohio State University, U.S.A., where he is to continue studies in Residue Concentrations of Antibiotics in Dairy Products.

Returned from Overseas.—Miss N. M. Foskett, Senior Extension Officer (Women's Services), returned from a special course in the United States of America on "Developing Leadership for Home Economics Programmes" and also the 9th International Congress of Home Economists.

Mr. P. C. Druce, Principal Economics Research Officer, returned from the United Kingdom, where he studied developments in research and extension in Agricultural Economics.

Dr. A. T. Pugsley, Director, Agricultural Research Institute, Wagga, returned from the first International Wheat Genetic Symposium and the 10th International Congress on Genetics—Canada. Dr. Pugsley also visited the United States of America, United Kingdom, Holland, Belgium, France and Italy.

Mr. G. J. Shanahan, Entomologist, returned from a private visit to the United States of America and the United Kingdom, having spent some time studying insecticidal resistance and ectoparasite control.

Mr. J. Piotrowski, Gardener, First Class, returned from a visit to the United States of America and Europe where he studied horticultural developments.

Visited Overseas During the Year.—Mr. V. H. M. Brann, Principal Livestock Officer (Poultry) attended the World Poultry Science Congress in Mexico and also visited poultry research centres and poultry farms in the United States of America and the United Kingdom, Rome, and Singapore.

Mr. M. W. McDonald, Livestock Research Officer (Poultry), also attended the World Poultry Science Congress and visited research centres in the United States of America, Canada, and the United Kingdom.

Number of Staff at 30th June, 1959

	Public Service Board	Ministerial	Total
Central Administration ¹	637	..	637
Division of Plant Industry	153	..	153
Division of Horticulture	109	..	109
Division of Dairying	134	..	134
Hawkesbury Agricultural College	65	65	130
Wagga Agricultural College	21	42	63
Experiment Farms and Stations	91	176	267
Division of Animal Industry—			
Head and District Offices	140	12	152
Meat Inspection Services	140	13	153
Queensland Border	44	..	44
Tick Quarantine Areas	50	713	763
Royal Botanic Gardens and Allied Activities	120	5	125
	1,704	1,026	2,841

¹ Including *inter alia* the Division of Science Services, Division of Marketing and Agricultural Economics, and Division of Information Services.

Architect's Branch

Loan Funds and Consolidated Revenue Funds expended on new works and maintenance work were as follows:—

Loan Funds	£71,097
C.R. Funds	£103,488

Work Completed.—This comprised the dairy products factory at the Hawkesbury Agricultural College; the new administration building, etc., new dairy buildings, and shed for animal research at the Wagga Agricultural College and Experiment Station; cottage renovations at Alstonville Tropical Fruit Research Station; a cottage and a hay shed at Cowra Experiment Farm; the agronomy shed at Grafton Experiment Farm; the plant breeders shed, cottage and town water supply at Tamworth Agricultural Experiment Station; the agronomy shed and hay shed at Trangie Agricultural Experiment Station; water supply to cottages at Wollongbar Experiment Farm; and toilet blocks at Wagga Agricultural College and Experiment Station,

Tamworth Agricultural Experiment Station, Temora Experiment Farm, Condobolin Experiment Farm, and New England Experiment Farm, Glen Innes.

Work Still Proceeding.—This includes the establishment of an irrigation farm at Narrabri; the administration building at Alstonville Tropical Fruit Research Station; the agronomy shed and electricity installation at Condobolin Experiment Farm; the shearing shed and yards at Cowra Experiment Farm; the fertiliser shed and water supply at Gosford Citrus Research Station; the shearing shed and yards at Leeton Experiment Farm; the poultry range houses, nutrition pens and facilities for broiler research at Seven Hills Poultry Experiment Station; the agronomy shed and hay shed at Yanco Experiment Farm; and a cottage at Keetah.

Maintenance Work.—This comprised painting and repairs to cottages and farm buildings at Alstonville Tropical Fruit Research Station, Bathurst Experiment Farm, Condobolin Experiment Farm, Cowra Experiment Farm, Grafton Experiment Farm, New England Experiment Farm, Glen Innes, Gosford Citrus Research Station, Temora Experiment Farm, Trangie Agricultural Experiment Station, Wollongbar Experiment Farm, Yanco Experiment Farm, Glenfield Veterinary Research Station, and Queensland Border; and the desilting of tanks, and maintenance and replacement of equipment, on the Public Watering Places in the Western Division of the State.

Extension Service.—Many inquiries concerning building problems were attended to, by letter and by personal interview; and plans representing buildings to the value of £168,075 were supplied to farmers.

Pastures Protection Section

Rabbit Control.—Last year's report recorded the Minister's establishment of a Rabbit Control Advisory Committee.

The Committee has recommended that "1080" should be introduced into this State but that its distribution to landholders should be only through Pastures Protection Boards. It further recommended that the poison be only available for distribution in a Pastures Protection District when an officer of the Board had been trained in its use. The Minister accepted the Committee's recommendations.

The first Training School was held at Mittagong, N.S.W., in June, 1959. The Senior Vermin Officer, Department of Agriculture, Tasmania, assisted by the Field Officer and Assistant Field Officer of the Pastures Protection Section, conducted the school.

Representatives of nine Pastures Protection Boards received the training and each, on returning to his District, was to conduct demonstrations in his District for the benefit of landholders generally. It is proposed that the Pastures Protection Board Officers will subsequently arrange for the poisoning on groups of properties.

The landholders will carry out the free-feeding of the furrows on their properties and will then bring their cut-up bait to a central point so that the Rabbit Inspector or Ranger may add the "1080" poison to it. The landholder will then lay the poison bait on the previously free-fed trail.

Further Training Schools will be conducted, for representatives of other Pastures Protection Boards.

A very encouraging degree of co-operation is being received from various governmental authorities, notably the Forestry Commission, Railway Department and the Soil Conservation Service. It is hoped that "1080" will be of great assistance to these authorities in the work of rabbit extermination on areas under their control.

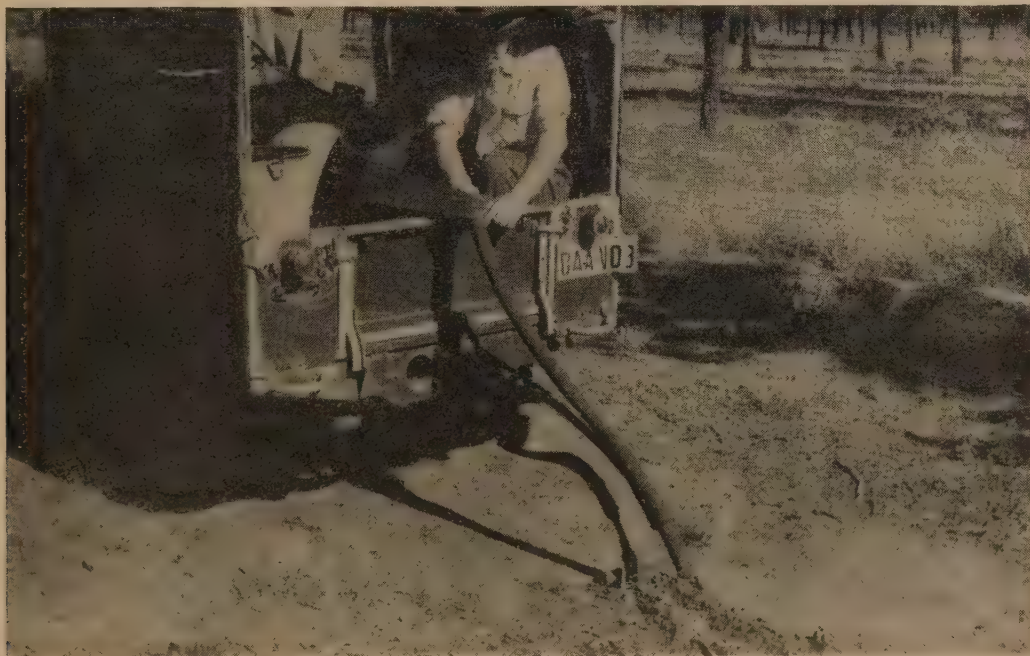
Since October, 1958, the Pastures Protection Field Officer has been able to devote practically the whole of his time to rabbit control work; due to the appointment of an Assistant Field Officer who has taken over the work of Reserves inspection.

Number of Licences Issued to Keep Fur-bearing Rabbits.—Twenty-six licences were issued, compared to 36 in 1957-58 and 18 in 1956-57.

Australian Plague Locust—Trial Control Campaign.—A considerable hatching of plague locusts occurred in the Bogan-Macquarie Outbreak Area in the spring and early summer of 1958. The Management Committee for the Campaign recommended that swarms flying in December be treated by aerial spraying but so little information was available on build-up and location of the swarms, that this proved impracticable.

Later the Management Committee discussed a proposal to control hopping swarms with micron sprayers and flying swarms with aircraft but, as the outbreak covered a much larger area than was at first envisaged, it was decided that restriction of control measures to the Bogan-Macquarie Outbreak Area would be impracticable. The proposal was not furthered.

Australian Plague Locust—Routine Control Campaign.—In the spring, summer and autumn of 1958-59 extensive hatchings of Australian Plague Locust occurred in many north-western and central-western districts. Insecticides carried over from the 1953-55 Campaign were transferred from storage



"Ten-eighty" (1080) Baiting for Rabbit Control"

The Department is supporting the use of Sodium fluoroacetate (1080) in poison baiting for rabbit control. The poison is released to a Pastures Protection District when field officers of the respective Pastures Protection Board have been through a short-term training school equipping them to assure that the poison is properly, safely used in their area.

(Photo—Pastures Protection Section)

points in the south-west to the infested areas. The B.H.C. had retained its effectiveness. It was used with considerable effect by landholders and by spraying aircraft.

In February and March, 1959, a great deal of work was carried out by landholders and by employees of Pastures Protection Boards in the destruction of grasshoppers on the ground by use of spraying equipment. For some time these methods proved extremely effective. Landholders co-operated enthusiastically. Heavy rain, however, made it difficult and at times impossible to get machinery into the paddocks; and ground control measures had to be discontinued.

In the northern districts, particularly Warialda, Narrabri and Pilliga, most of the hopping swarms had been dealt with; but further south, in Dubbo, Molong and Forbes, work had to be discontinued before any real impression had been made on grasshopper numbers. The Department therefore decided to employ a number of light aircraft for spraying.

For survey and location of swarms three Auster scouting aircraft were employed in addition to the spray aircraft.

Many migrating swarms were destroyed by aerial spraying. Importantly, the technique of treatment by spraying migrating swarms at key points on recognised driftways worked just as effectively as it had done in the south-west in 1955.

If weather conditions are favourable large swarms could develop from eggs now in the ground and there could be an infestation in plague proportions throughout central western New South Wales in 1960, with a lesser degree of infestation in north-western and western areas.

BHC insecticide has been ordered and, with stocks on hand from the last campaign, will be placed at strategic points throughout the areas that may be most affected.

Dingoes.—Aerial baiting was used to an increasing extent by the Central Tablelands and Hunter and by the Lower North Coast and Tablelands Dingo Destruction Boards. The first-named Board discontinued the payment of scalp bonuses within its District so that funds could be applied to increased aerial baiting.

Assessment of the results of aerial bating is difficult. The baiting is mainly in inaccessible areas and the only assessment is through the prevalence of dingoes in the surrounding areas. It could take years to get any clear picture of the results.

Subsidies were paid to Dingo Destruction Boards as under:

	£
North Coast and Tablelands	1,914
Lower North Coast and Tablelands	2,088
Central Tablelands and Hunter	533
Southern Tablelands	3,000
	<u>£7,535</u>

Travelling Stock Routes and Reserves.—Large numbers of travelling stock had used the Stock Routes and Reserves during the dry spell in 1957 and 1958 but the numbers decreased with an improvement in seasonal conditions.

It had been stated in many quarters that with falling wool prices the number of stock moving on foot would greatly increase; due to lower costs as compared with their transport by motor float. Although wool prices have fallen considerably there has been no noticeable increase in the number of stock travelling on foot. Thus this argument, used in favour of general retention of travelling stock reserves, is not borne out.

Prior to the P.P. Field Officer being transferred to duties more closely associated with rabbit control work, he inspected 49 reserves in three Pastures Protection Districts. The Assistant Field Officer, who commenced duty in October, 1958, inspected 91 reserves in five Pastures Protection Districts to the end of June, 1959.

The Pastures Protection (Amendment) Act, 1951, included a provision enabling Travelling Stock Reserves or parts thereof to be withdrawn from the control of Pastures Protection Boards on the recommendation of the Minister for Agriculture. Applications for revocations of parts or the whole of Travelling Stock Reserves dealt with from the 7th December, 1951, to the 30th June, 1958, totalled 3,131 whilst during the past



“Sulphur Response at Tia”

Extensive glasshouse and field studies of the residual effects of sulphur and phosphorus are proceeding. In this field trial at Tia there has been a marked response by clover to sulphur application four years after a heavy application of superphosphate. The strips on the right and in the foreground represent dark green, high protein clover under sulphur treatment; contrasting with the strips on the left representing pallid, low protein, poorly growing clover untreated.

(Photo—Chemist's Branch)

year a further 303 applications were dealt with. Cases dealt with up to 30th June, 1959, and acreage involved, are summarised as follows:—

	Reserves, Number	Acreage
1. Recommended for withdrawal with consent of Pastures Protection Boards	1,819	122,119 (i)
2. Recommended for withdrawal without consent of Boards	391	52,797 (ii)
3. Referred to Land Board by Minister, for Inquiry, but not yet completed	12	714 (iii)
4. Referred to Land Board by Minister, for Inquiry— (a) Land Board recommended part revocation (b) Land Board recommended against revocation	5 4	604 239
5. Boards not agreeable to revocation— (a) Investigation upheld Board's decision (b) Recommended for re-investigation at later date	563 32	91,536 (iv) 7,485 (v)
(c) Awaiting investigation	561	9,974 (vi)
6. Awaiting replies from Boards as to whether they are agreeable or otherwise to revocation	175	16,809 (vii)
	3,562	302,277

- (i) This figure excludes the unknown acreage of 337 reserves.
(ii) This figure excludes the unknown acreage of 7 reserves.
(iii) This figure excludes the unknown acreage of 9 reserves.
(iv) This figure excludes the unknown acreage of 59 reserves.
(v) This figure excludes the unknown acreage of 2 reserves.
(vi) This figure excludes the unknown acreage of 242 reserves.
(vii) This figure excludes the unknown acreage of 76 reserves.

The following figures indicate the position in regard to reserves during the years ended 30th June, 1958, and 30th June, 1959:—

Period	Applications	No. of Reserves investigated by Field Officers
Year ended 30th June, 1958.	592 reserves were applied for, and Boards indicated their objections in respect of 220.	208
Year ended 30th June, 1959.	303 reserves were applied for, and Boards indicated their objections in respect of 275.	128

In 1950 the Boards were requested to survey the Reserves in their Districts and advise as to which would be surplus. As a result, and prior to the amendment of the Act in 1951, fourteen boards advised that they were agreeable to relinquish 128 reserves, or parts thereof, comprising approximately 15,000 acres.

Staff Statistics—Pastures Protection Boards

Numbers	Year ended	
	30th June, 1958	30th June, 1959
Veterinary Inspectors—		
Appointed	2	4 (inc. one acting)
Transferred	..	1
Resigned	2	3 (inc. one acting)
Secretaries—		
Appointed	12	5
Resigned	8	3
Retired	4	2
Rabbit Inspectors—		
Appointed	9	5
Resigned	2	..
Appointed as Ranger	2	..
Dismissed	2	..
Rangers—		
Appointed	8 (inc. 1 part-time).	4
Resigned	3 (inc. 1 part-time).	4
Retired	1	1
Dismissed	1	..

Rangers and Rabbit Inspectors Association.—A Rangers and Rabbit Inspectors Association has been approved by the N.S.W. Industrial Commission, replacing the Rabbit Inspectors Association.

Clerical Assistants—Rate of Payment.—Arising from a resolution submitted by the 1958 Annual Conference of Pastures Protection Boards, the Minister indicated that he would be prepared to consider any recommendation made by a Pastures Protection Board to pay a female clerical assistant in excess of the rate prescribed by the Clerks Award on the grounds that the nature of the duties being performed and the efficiency of the employees are such as to warrant payment at a higher rate. Special cases were submitted in this regard. The Minister approved of certain clerical assistants being paid at the rate next above that applying to their age.

Biometrical Branch

Summary of Main Services.—This Branch specialises in the design of investigational work and in methods-research, and aims to improve the standard and efficiency of research and experimentation. Advice on choice of most efficient methods of conducting experiments is available to all sections of the Department; by consultation when plans are in preparation, or as advice for improvement of proposals already formulated in Divisions. Then, at the conclusion of individual investigations, the Branch is available for mathematical-statistical examination of experimental results and for critical report on the significance or reliability of conclusions to be drawn from the data obtained.

Nearly all investigational work requires biometrical assistance at some stage, and advice was given during the year on a wide variety of subjects concerning the design, analysis and interpretation of results of experiments.

On the design side, the advice concerned such matters as choice of fertilisers and rates of application in experiments with pastures and field crops; sampling methods for soils, fruits, animals and pastures; ancillary measurements for covariance analyses; selection of sites, and size and arrangement of plots for field work with fruit, crops and pastures, and experimental designs proper.

The volume of statistical computing requested by Divisions was of the same order as in 1957-58. Work of this kind has been continued for numerous projects mentioned elsewhere in this Report of the Department.

Punch-Card Section.—The Hollerith Unit, employing six machine-operators and comprising junior-tabulator, reproducer, sorter, punch and verifier, processes all records from Group Herd Recording.

Job-experience proved that additional equipment is necessary for most efficient working of the Unit and this was ordered in September, 1958. The extra equipment comprises a second automatic punch, a second automatic verifier, and a collator with counting-feature. When received, the collator will be of very considerable assistance and will permit positive direct merging and selection of cards. This will reduce the burden and excessive frequency of card-sorting and also eliminate the need for time-consuming hand-plucking of cards from the stack. The counting-feature which has been specified on the collator will check for non-matching cards and for incomplete sequences. It is expected to do away with the need for current slow and tedious procedures of listing all cards and then sight-checking for missing information.

Herd Recording Data—State Summaries.—The State Summary for 1957-58 covered some 44,000 cows.

Each co-operating farmer was supplied with an Animal Herd Summary giving particulars for each animal of breed, date of calving, times calved and number of lactations recorded, in addition to months under record for the current lactation, milk production, fat production and percentage fat.

The final, annual summary-tables supplied to the Division of Dairying give production statistics for different districts, units and herds, and for cows of different breeds, age-groups, lengths of lactation and the like.

Sire Survey records for all sires whose daughters are recorded in the Group Scheme were maintained; the whole set re-sorted in age-groups and reproduced.

EXPERIMENT FARMS AND STATIONS BRANCH

Scope

Technical, subject-matter work of the various Experiment Farms/Stations/Sub-stations of the Department is covered in the reports of the Divisions of Plant Industry, Animal Industry, Horticulture, Dairying, and Science Services, and the Agricultural Colleges.

Functions of the "Experiment Farms and Stations Branch" are administrative, in two main categories—developmental and operational. The Branch has the responsibility of providing reasonable facilities at all Experiment Farms/Stations/Sub-Stations, to enable efficient conduct of their research, educational, extension and administrative activities.

In 1958-59 the Branch dealt with needs of eighteen Experiment Farms and Stations. Its responsibilities extended also to the supervision of Farm operations of the two Agricultural Colleges—Hawkesbury and Wagga, the Glenfield Veterinary Research Station, and the Plant Industry Research Centre located at the Child Welfare Institution at Berry.

The year has been one of steady development and improvement on Experiment Farms and Stations.

Though progress has been slower than desired, much of the ground lost due to the Second World War has now been regained. However, to keep pace with agricultural and pastoral needs these research institutions must be provided increasingly with resources for research work and farm maintenance programmes; thus calling for increased allocations of funds.

The developmental aspects include:—

- (a) Provision of improvements and equipment to new Experiment Farms and Stations to make them operational.
- (b) Improvements and equipment to established Farms and Stations to enhance their operation or widen their scope of activities.

The operational aspects include:—

- (a) Provision of staff and labour to meet regular and short-term requirements.
- (b) Repair, replacements, maintenance, and additions, to existing facilities and equipment, including buildings, water supply, fencing, roads, machinery and vehicles.
- (c) Provision of supplies for the activities of each Experiment Station—e.g., fuel, seeds, fertilisers, fungicides and general requisites.
- (d) Attention to welfare and conditions of living and employment of employees.

- (e) Internal organisation of production of working necessities, e.g., fodder for livestock, and its distribution to institutions in less favoured localities, seed for winter feed production, etc.

Developmental

Tropical Fruit Research Station, Alstonville.—Active measures were taken to develop this new Station. A cottage was renovated for occupation by the Officer-in-Charge, an administrative building is in the course of erection, and foreseeable requirements of farm machinery were purchased. An irrigation system is to be installed, and preliminary investigations have been made in this regard. It is anticipated that the first plantings of tropical fruits for research purposes will be made in the autumn of 1960.

Cowra Experiment Farm.—This has been relatively inactive in research work for some years, due to re-orientation of the Farm to meet the inroads of soil erosion. It is now increasingly active in the investigational fields, agronomic and animal industry. Further improvements have had to be provided to permit this work.

Condobolin Experiment Farm.—Further progress was made by provision of a new Agronomy Shed, remodelling of the shearing shed, completion of a water reticulation scheme, and additional fencing. Sewerage was attached to Farm cottages, all administrative buildings, and employees' amenities centre.

Agronomy research has now reached good proportions on this Farm. An increase in livestock research is also envisaged, as circumstances permit.

Gosford Citrus Experiment Station.—Funds were provided and work was commenced, towards a water supply scheme for irrigation in the development of the Somersby Section of Gosford Citrus Experiment Station. The tiled drainage system was also increased. A new storage shed was provided.

On the Narara Section, maintenance work and bridge construction have been outstanding achievements, through the enterprise and initiative of the Officer-in-Charge.



"New Experiment Stations Are Being Developed"

These cattle yards have been erected at the recently established Tamworth Agricultural Experiment Station. This Station will be primarily a wheat improvement centre for the north, but livestock establishments are being developed there also—for grazing control and nutrition research.

Other new centres, currently being developed in the building-up programme for the Department's research functions, include Narrabri Experiment Farm, Alstonville Tropical Fruit Research Station, Gosford Citrus Experiment Station, and Lower Murray Research Station.

(Photo—Tamworth Office)

Grafton Experiment Farm.—Increasing demands for working and storage space in agronomy work at Grafton Experiment Farm necessitated the construction of a new Agronomy Shed. An extension into sheep raising activities called for some water supply and fencing additions.

Leeton Experiment Farm.—Development of Leeton Experiment Farm as an extensive, irrigated, livestock and agronomic research centre, and fodder production unit, was furthered by two new hay sheds, substantial increase in subdivision fencing, and an increase in water storage facilities.

Lower Murray Research Station, Dareton.—An additional 282 acres of land has been reserved by the Water Conservation and Irrigation Commission for addition to the Lower Murray Research Station at Dareton, to enable expansion of citrus fruit and irrigation practice research.

Narrabri Experiment Farm.—This is still in process of establishment. An administrative building and a machinery shed were completed. An irrigation plant was installed and delivery channels were constructed. Fifty acres of land were prepared for irrigation. Additional Farm plant was provided. The maintenance road was formed and gravelled.

Research work with cotton, maize, sorghum, wheat and pastures was commenced.

New England Experiment Farm.—A laboratory was constructed and equipped for extension of activities into tobacco improvement and plant pathological research. A glasshouse was erected for improvement of the Farm's tobacco research, and the glasshouse provided previously for tobacco research was fitted up for operation.

Considerable progress has been made in extension of water supply for the establishment of a beef cattle section.

Tamworth Experiment Station.—Progress was made towards development of Tamworth Experiment Station as a Research Institution, by the provision of a Manager's residence, Plant Breeders' Shed, and fencing improvements.

Public Works Department also completed water mains and associated work for a joint water supply scheme to service Farrer Agricultural High School and the Experiment Station from Tamworth City Council supply. Development of livestock work at Tamworth called for the provision of cattle yards. These were constructed by the Farm personnel.

Trangie Agricultural Experiment Station.—The improvement in recent years was continued in 1958-59 by provision and erection of £900 worth of fencing material; for better control of stock and of pasture utilisation, in the conduct of livestock research.

Yanco Experiment Farm.—Substantial developmental work was undertaken. A main lecture room has been renovated for short-term schools, new office accommodation has been provided for a number of the professional staff, a laboratory has been equipped for a pathologist and a similar unit is being prepared for an entomologist.

Two new, large irrigation plants have been installed, for use by the Divisions of Plant Industry and Horticulture. Plans have been prepared for redesign of approximately 500 acres for irrigation.

Operational

Individual Farms.—Considerable maintenance work and additions were carried out on existing buildings and structures. This work was directly supervised by the Department's Architect, except for some less detailed maintenance activities undertaken by the respective Farm Manager and carried out by Farm employees.

At Bathurst Experiment Farm, a room in an existing building was converted and equipped as an employees' amenities room; a shed was remodelled to house a fruit-washing machine; general minor work was done on a number of buildings; and the entrance drive was tar-sealed in association with the Department of Education.

At Cowra Experiment Farm the Manager's residence was renovated and painted; and the water system connected with Cowra water supply was improved. In the latter work, two 20,000-gallon concrete storage tanks were erected in co-operation with the Soil Conservation Service. A new residence was completed for the Farm Foreman; extensive painting of farm buildings was undertaken; and fencing was erected for livestock research projects.

At Grafton Experiment Farm the building maintenance was substantial. Five cottages were renovated, modernised and painted. Several other main buildings were painted and some were renovated.

At New England Experiment Farm a hot-water system was installed in the Manager's residence; a room in the quarters was fitted up as a Mess for professional officers; sewerage was attached to one cottage; and an Ablutions Block was provided and connected to the sewer.

At Seven Hills Poultry Experiment Station grain storage bins were erected for better storage of grain feed for poultry.

At Temora Experiment Farm a regular building maintenance programme is operating. The Manager has initiated repairs such as cement verandahs, cement flooring of sheds, and painting of buildings. An Ablutions Block for employees was constructed, and sewerage was attached to cottages and the Administrative Block. Steps were taken to repair erosion damage to the spillway on one of the main water storage dams.

At Trangie Experiment Station similar constant attention has been given by the Manager to maintenance work not calling for the services of tradesmen.

At Yanco Experiment Farm a maintenance gang of two carpenters and two painters has been employed for the full year on general maintenance and improvements.

At Wollongbar Experiment Farm the water reticulation scheme to Farm cottages and other buildings was completed, and the main entrance drive was tar-sealed.

The employees' cottage at Duck Creek Sub-station was renovated and painted and provided with sewerage. Further attention was given to improved drainage of Farm paddocks.

Fencing, General.—Fencing replacement and maintenance work at Experiment Farms and Stations was considerable. The total fencing, including new lines, replacement and repairs, involved an expenditure in materials of approximately £6,300. Length of fences involved was approximately 15 miles. Improvements were also effected in erection of new gates, painting of same and the installation of grids for vehicular traffic.

Road Formations.—In addition to tar-sealing of roads, previously mentioned, road forming, gravel surfacing, and road repairs have been a feature on many Farms. Work of a substantial nature was done at Leeton, Narrabri and Yanco Experiment Farms.

Irrigation.—On all irrigation Farms some extension in irrigable area was made by levelling of land and provision of water channels; and at Yanco Experiment Farm plans were made for redesigning about 500 acres of irrigation land.

Farm Machinery.—The Experiment Farms Branch is responsible, by recommendations to Government Stores Department, for all farm machinery purchased for Experiment Farms. This called for an expenditure of £15,000 in 1958-59.

The expenditure was incurred in replacing expendable power plant and machinery, provision of new plant for research work, and extension of the general farming plant, as instanced in the "Fodder Conservation" section of this Branch report. Some of the major items of plant supplied were: five tractors, one orchard spray, one milking machine, one hammer mill, three scarifiers, two pickup balers, one dehydrator, two power mowers, two irrigation land planes, one side delivery rake, one set of platform scales, one grain auger, and one Histokinette.

Inadequacy of funds provided for purchase of farm plant is emphasised by the fact that estimates from all Experiment Farms for 1959-60 have called for equipment estimated to cost approximately £60,000. On no occasion has a sum in excess of £15,000 been allocated from Consolidated Revenue Fund for the purchase of Farm plant.

Seriousness of this position is apparent when it is realised that thirteen of fifty-two tractors located at Experiment Farms have exceeded their economic life of 10,000 operational hours, and that present funds permit the purchase of only four or five tractors per year.

Importantly, lack of funds for plant for research work is accentuated by the fact that the appropriations for plant do not cover the requirements of basic Farm plant replacement.

The Branch also acts in a recommending capacity for the purchase of farm machinery requirements at Wagga and Hawkesbury Agricultural Colleges and Glenfield Veterinary Research Station. Further, its advice is being increasingly sought by other Divisions and Departments in the purchase of this type of equipment.

General Equipment, Materials, etc.—Farm operation and conduct of research work calls for a large and timely supply of a wide range of materials, minor items of equipment, and

services. Generally these requirements were expeditiously met. A total expenditure of £50,000 was involved and subject to oversight by the Branch.

Motor Vehicle Responsibilities for the Department

During 1958-59, the Branch's activities relating to acquisition of new motor vehicles substantially increased.

In addition to responsibilities in determination and recommendation of new vehicles for Experiment Farms, the Branch now has also the responsibility of taking delivery of all new vehicles supplied to the Department, in order that they may be competently checked upon delivery. The Department received eighteen new vehicles. Twelve were allocated to Experiment Farms—nine to replace existing worn-out vehicles, and three as additions.

The Branch has the responsibility also to inspect all Departmental vehicles attached to Head Office; to determine likely necessary repairs, to inspect vehicles after repair work has been completed, and provide a clearance.

Testing Agricultural Machinery

The Branch continued to co-operate with the Commonwealth Department of Primary Industry, in testing all agricultural machinery provided by funds from the Commonwealth Farm Mechanisation Research Grant.

Tests were continued with a number of units previously provided, and two new items were subject to trials.

In this respect, considerable activity was associated with the testing of the John Deere Sod Seeder, the Bermuda Sprig Planter, the Stanhay Seed Spacing Drill, the Idens Orchard Spray, and a number of mist-spraying units.

Additional items provided under this Grant are the Mobile Cereal Stripper and a fruit-washing machine; the latter to be installed at Bathurst Experiment Farm.

Some other tests were made with machinery loaned by private firms; a chisel plough, a silorator forage harvester, a multi-trash seeder and other items.

Mechanisation Van—Mobile Demonstration Unit

The Mobile Mechanisation Van, financed by the Commonwealth Agricultural Extension Grant, was directed by this Branch.

The Van was transferred from the Western Agricultural Region (Orange) to the Northern Agricultural Region (Tamworth).

Lectures, demonstrations, and film evenings have been conducted and it has been in attendance at field days, local shows, and other group occasions, to provide advice on farm machinery and equipment maintenance.

Enquiries are still being received from the Western and Southern Regions where the unit was previously located, emphasising farmer interest in the unit's work, and extension of the service must be considered.

Fodder on the Experiment Farms, and Stations

The good cereal harvest and abundant pasture in 1958-59 made possible the replenishment of fodder stocks heavily depleted by the drought in 1957-58.

At 30th June, 1959, there were some 2,000 tons of hay and other roughage and 30,000 bushels of grain stored at Experiment Farms. This is sufficient for the immediate fodder needs of all Farms and the drought fodder needs of Farms located in drought liable areas (in all but extremely bad conditions). Further reserves will be made in the coming season.

The estimated value of fodder now in reserve is £35,000; made possible by the policy of progressive supply of modern and efficient fodder harvesting equipment to Experiment Farms, to take advantage of a bountiful season.

Some 310 tons of hay (lucerne, pasture, cereal) and other roughage, and 14,800 bushels of grain (wheat, oats, maize) were transferred from certain Farms or Stations to others where experimentation activities, other projects, or climatic conditions, limited fodder conservation. Estimated value of fodder so transferred is £10,500.

Purchase of fodder for Experiment Farms, Stations and Colleges was thereby practically confined to concentrates. Expenditure on these items was some £4,800.

Liaison with Subject-Matter Divisions

The Experiment Farms and Stations Branch maintained close liaison with the Divisions of Plant Industry, Animal Industry, Horticulture, Dairying, and Science Services, and with the Architects Branch, throughout the year.

Professional staff is provided for the Farms and Stations, and the College Farms, by the subject-matter Divisions.

The following staff changes occurred in the Head Office section of the Branch. Mr. T. E. Kitamura, formerly Assistant Principal Agronomist (Experiment Farms and Stations Branch) was transferred to the position of Special Agronomist (Misc. Crops) in Plant Industry Division; and Mr. E. C. Powell, formerly Manager of New England Experiment Farm, was transferred to the position formerly held by Mr. Kitamura.

Mr. E. Tindale, Plant Industry Division, formerly District Agronomist at Wagga, was appointed Manager of New England Experiment Farm; Mr. J. England, Plant Industry Division, formerly District Agronomist at Inverell, was appointed Manager of Condobolin Experiment Farm in succession to Mr. A. Woodward transferred to the position of District Agronomist, Wagga; Mr. D. Leigh, Horticulture Division, formerly District Fruit Officer at Parramatta, was appointed Officer-in-Charge at Alstonville Tropical Fruits Research Station; and Mr. A. Murray, Horticulture Division, District Fruit Officer in the M.I.A. was appointed Acting Superintendent of Griffith Viticultural Nursery.

As usual there has been a constant turnover of regular employees; and casual labour for seasonal work has been employed up to the limit of available funds.

Generally there has been an improvement in housing and amenities provided to resident officers and employees; and progress has been made in improving general maintenance and facilities affecting employees, as outlined in previous paragraphs.

DIVISION OF PLANT INDUSTRY

Staff

At 30th June there were four vacancies, in the Divisional establishment of 103. Establishment strength increased by two. The two new positions are concerned, respectively, with black soil scarab investigations at Inverell, and pasture research in the Hunter River area.

Group Concentration of Research Personnel.—Progress has been made with the policy of concentrating much of the research staff in groups, so far as the research problems concerned will permit. At present, two institutions have six agronomists, two have five, one has three and seven have two. Two Experiment Farms each have a single diplomate, in training. Two graduate Research Agronomists are in Districts and not located at an institution.

Increasing the Experience of Research Personnel.—During the War, only two agronomists remained on Experiment Farms. They were primarily concerned with pure seed production of cereals.

When research work was recommended after the War, only five agronomists with research experience were available for research at Experiment Farms; and within two or three years they were required for other duties, mainly at Head Office. Their places and the many other agronomist vacancies on Experiment Farms were filled by inexperienced officers—diplomates and graduates.

Over the past fourteen years there has been an intake of 146 agronomists; but resignations (68), deaths or retirements (19), transfers (28) and secondments (10) have accounted for a loss of 125 in the same period.

The effect of rapid changes in staff, on stability of research activities, has been accentuated by the fact that one-third to one-half of the agronomists at Experiment Farms are there in training as future district officers for extension services.

Of the 44 Agronomists at present at the Experiment Farms/Stations and Colleges, 14 are there pending ultimate appointment to districts as extension officers, and of the other 30—classified as research men—only one-third have more than five years' experience.

Despite the heavy losses of research personnel through resignations or transfers, a hard-core of research men is gradually building up. Objectively, that hard-core would at present be numbered at ten—the men with more than five years' experience. Twenty more are carrying out investigational work under constant supervision, acquiring research experience.

District Research Agronomist System.—The first two "District Research Agronomists" have been appointed; one at Inverell and the other at Maitland.

The District Research Agronomist appointment to Inverell was made because of the ravages of the insect known as Black Soil Scarab. In the Inverell area, a centre of heavy infestation, the acreage affected has increased from 40,000 acres to 100,000 acres since February, 1958.

In the case of the District Research Agronomist stationed at Maitland, financial support for a period of five years has been provided by Australian Fertilisers (£750 p.a.), the Sulphide Corporation (£750 p.a.) and the Hunter River Co-operative Dairy Factory (up to £1,000 p.a.).

Trials have been initiated on several properties in the Hunter River Valley following discussions between representatives of the Department and the aforementioned donor Companies.

Staffing of Districts.—There was little improvement in the overall position. Because of lack of trained personnel, the filling of some district vacancies was not possible.

One District Agronomist resigned, to engage in farming on his own account; another was promoted to the position of Regional Supervisor, North-Western Region; and two were appointed as Experiment Farm Managers.

A new district was created in the north-west, with headquarters at Moree. This area has an immense potential. Formerly it received only remote attention, from the Agronomists stationed at Gunnedah and Inverell. The Junee office has been closed and the district absorbed into the Cootamundra and Tumut districts.

There are thirty-four established Agronomist districts, of which three, viz., Queanbeyan, Gunnedah and Bathurst, remain vacant.

A number of relatively junior Agronomists continued to receive in-service experience to fit them for district duties. They are stationed at Experiment Farms and, as time permits, receiving part-time experience in districts.

Regional Conferences.—Plant Industry officers' Regional Conferences were held at Yanco, Leeton, Temora, Berry, Cowra and Grafton.

Some Research Trends

STATE-WIDE UNIFORM TRIALS—TESTING EXISTING KNOWLEDGE

A major development has been the widespread establishment of three sets of uniform trials; to determine the extent to which existing research knowledge can be applied today to raise the yields respectively of pasture, wheat, and potatoes.

Uniform Pasture Survey Extension Trials (U.P.S.E.T.).—Prepackaged materials have been despatched to District Agronomists. The prepackaged trials, as a result of discussions between Division of Plant Industry and Division of Science Services are designed to clarify information in respect of establishment and the fertiliser requirements of pastures, and to answer the question "What species should the farmer in a particular district grow?"

There are eleven types of trial in the U.P.S.E.T., in three main categories: species trials (177), establishment trials (73), and plant nutrition trials (145).

Wheat Uniform Fertiliser Trials (W.U.F.T.).—These have been sown on nineteen soils throughout the State.

Results of the many pre-war wheat fertiliser trials do not, in many instances, apply to present-day conditions. This is because of changed land use, and probable build-up of phosphate residues in the soil. Moreover, most pre-war trials were concerned only with superphosphate.

The present trials provide for four rates of superphosphate, four rates of nitrogen, and two of potash, and minor elements.

Potato Uniform Fertiliser Trials (P.U.F.T.).—These aim to overcome the lack of adequate information on fertiliser requirements of potatoes. The P.U.F.T. treatments provide a range of applications of superphosphate, nitrogen, and potash fertilisers. Twelve of these trials have been prepared for sowing.

INDUSTRY FUNDS FOR RESEARCH

There has been an increase in specific "industry" funds for research. Examples occur in the following tabulation:—

Funds for Research

Source	Purpose	Amount
Tobacco Industry Research Fund.	Tobacco Research	£ 10,000
Rice Industry	Rice Research	2,300
N.S.W. Wheat Industry Research Committee.	Wheat Research at Tamworth Agricultural Experiment Station.	25,000
N.S.W. Wheat Industry Research Committee.	Black Soil Scarab Control....	1,600
Australian Fertilisers Ltd.	Pasture Research, Hunter Valley.	750 (p.a.)
Sulphide Corporation	Pasture Research, Hunter Valley.	750 (p.a.)
Hunter River Co-operative Dairy Co.	Pasture Research, Hunter Valley.	1,000 (up to, p.a.)
I.C.I.A.N.Z.	Nitrogen utilisation	6,500 (over three years).

In the case of the Wheat Industry Research Funds, the £25,000 allocated for development of wheat research at the Tamworth Station and the £1,600 for black soil scarab investigations are in addition to funds provided for the Chemist Branch, Division of Science Services, investigation into wheat segregation, and some financial support to the Department's Agricultural Research Institute, Wagga.

A strong case has been prepared for financial support from funds becoming available under the Dairy Produce Research and Sales Promotion Act, 1958; for Departmental research affecting the dairy industry, especially on the north coast.

Some Extension Trends

Today the rural community desires to be kept fully informed of the latest developments in agriculture and in consequence there is an ever-increasing burden placed on the Department to provide guidance and advice. Unfortunately, this demand cannot be fully satisfied with the resources available. In an endeavour to meet requirements, group and mass media of rural education are present day trends. These media unquestionably assist in the dissemination and diffusion of knowledge; but they also lead to increased demand for "on the spot" advice through individual contact with field staff. In consequence, the latter are increasingly hard pressed to meet demand for their services.

Private organisations interested in primary production, e.g. Fertiliser, Chemical, and Wool Companies, are developing and extending their extension services. These organisations, with goods to sell, or "handling—business" to solicit, are combining these purposes with advisory service.

There is also increased primary producer interest in the possibilities of farm management groups, as adviser-employing bodies. One has operated successfully in the Bombala district for some years, and others are mooted. At Wagga, applications were recently called for the position of Agronomist, with a salary range of £1,700 to £2,000 per annum with liberal allowances and facilities. Inevitably these private adviser-employing groups, and adviser-employing groups in commerce, will increase. It is a sign of progress; but a disturbing feature, only from the viewpoint of stability in staffing Departmental services, is that the Department may increasingly be a training area for extension workers who move to positions outside the Department.

There is increasing producer-awareness of the importance of improvement in farm management methods. This and a changing economy have placed greater emphasis on economic aspects of production. New or different practices are increasingly closely examined under the light of such questions as "will it pay to change the farm programme by adopting this, that or another finding?"

Agronomists have been given organised opportunities to keep fully informed of technical and economic developments; per medium of schools and conferences. Some of the major fixtures attended by extension officers included: the State Conference of District Agronomists; a School on Aerial Agriculture at Hawkesbury Agricultural College; at regional levels—the Division of Plant Industry, Wheat Breeders', C.S.I.R.O., Weeds, Irrigation, and Southern Tablelands Survey Conferences; an Extension Methods School held at Newport; a Refresher Course at Sydney University; an Agricultural Economics and Farm Management School at New England University; and an Irrigation School at Yanco Experiment Farm.

Advisory services by District Agronomists were maintained at a high level during the year. Some 200 field days were arranged, attracting attendances aggregating in excess of 13,000. Agronomists also addressed at least 170 meetings, with attendances aggregating 5,700.

Fertilisers

Coincidental with the fall in wool and mutton prices, and a contraction of markets for a number of other primary products, there was no appreciable increase in the consumption of superphosphate. Had more favourable economic conditions prevailed, the use of superphosphate may have been much higher. (Consumption of superphosphate in Australia exceeds 2,000,000 tons annually, of which 741,000 tons are used in Victoria.)

With an increase in the area sown to wheat in 1959, superphosphate demand for this purpose increased; but this increase was largely offset by less superphosphate being used for pastures.

The off-peak rebate scheme, of £1 per ton on superphosphate when delivered prior to the 30th September, introduced by the Fertiliser Companies in 1958, proved successful. It conditioned a more even demand for fertiliser during the year; formerly there was little demand for superphosphate during winter.

Two significant changes occurred in the distribution and application of superphosphate.

Firstly, bulk handling and conveyance of this fertiliser markedly increased; in 1958, approximately 15,000 tons was delivered in bulk, compared with 42,000 tons in 1959.

Secondly, aerial topdressing increased, and practically all bulk superphosphate was used in this way; for 12 months ended March, 1958, 51,854 tons of superphosphate was aerial-spread on 959,955 acres and it has been estimated that figures for 1958-59 will show a 40 per cent. to 50 per cent. increase.

Competition between aerial operators was exceptionally keen, with consequent reduction in the cost of spreading. The cost has now been stabilised at £3 15s. per ton.

To further reduce the costs and increase the demand for superphosphate, fertiliser manufacturers formulated a group plan to streamline and rationalise the handling and spreading. Organised by the principal fertiliser distributors on a district or zone basis, fertiliser will be delivered in bulk and spread by contractors at a "cost on the ground" price.

Demand for nitrogenous fertilisers has increased; outcome of research indicating the value of nitrogen for promoting increased growth of pasture and fodder crops during the winter and early spring months. Sulphate of ammonia and, to a lesser extent, nitrate of soda were the principal nitrogenous fertilisers; but use of urea and calcium ammonium nitrate increased.

The value of sulphur, principally for use on basaltic soils in northern areas, is increasingly recognised.

Use of gypsum, as a cheap source of sulphur, and sulphur-fortified superphosphate, increased.

Fodder Conservation

Seasonal conditions were very favourable and, with crop production approaching record figures, landholders generally have conserved considerable quantities of fodder as reserves for drought and supplementary feeding.

Production of oat grain was a record, and most of the crop was stored on the farms. Lucerne crops also were particularly good, and large quantities of lucerne hay are now held. There was keen interest in silage, and increasing appreciation of the value of silage as a stored fodder.

Mechanical equipment now becoming available for silage making has given a great impetus to this form of conserved fodder, particularly in coastal areas. Extension officers of the Division continued to stress the necessity for fodder conservation. They have also made recommendations for improvement of and advised machinery manufacturers as to the suitability and usefulness of their machinery products.

War Service Land Settlement

During the year, six Accredited (Ballot) Estates were subdivided into 24 farms, and three farms were settled under Promotion Estates. The amount expended on the former was £343,355; and on Promotion Estates—£64,100.

The Land Settlement Officer, Division of Plant Industry, accompanied the Closer Settlement Advisory Board on the inspection of two Estates, and accompanied officers of the Water Conservation and Irrigation Commission on the inspection of one Estate. District Agronomists inspected and reported on three Estates, and assisted in the inspection, planning, and subdivision of a further four Estates.



"Increased Pit Silage"

Interest in silage is still increasing. Pit silage is the cheapest method where the site has suitable drainage and freedom from rock. Extension workers have found it necessary to emphasise the importance of proper sealing.

(Photo—Maitland Office)

Soldier settlers have co-operated with the Department in conducting crop and pasture experiments, field days, etc.

Co-operation in C.S.I.R.O. Rainmaking Experiments

C.S.I.R.O. Radio Physics Division continued investigational work during the year into cloud-seeding, or, as more popularly known—"rain making".

Two experiments are in progress in New South Wales, one on the Snowy Mountains, and the other on the northern tablelands. There is also an experiment in Queensland, on the Darling Downs, and another in South Australia.

Final arrangements were made to conduct an experiment over the Warragamba Catchment Area, extending from Lithgow to Goulburn. The Metropolitan Water, Sewerage and Drainage Board is providing some finance for this work.

The Department co-operated by providing a "referee". His duties consist of advising the C.S.I.R.O. when, because of too much rain or danger of flooding, seeding operations should be temporarily suspended.

Wheat

THE SEASON

Despite vagaries of the season, the State had a fair grain harvest. Had wheat crops continued to show the remarkable promise apparent until an advanced stage of growth there would have been a record average yield per acre. That was checked, however, by a number of factors; extreme frost damage, stem rust in epidemic proportions in some northern and central districts, and premature ripening of some southern crops.

ACREAGE AND PRODUCTION

Receivals of wheat from the 1958-59 harvest by the Australian Wheat Board totalled some 59,670,000 bushels, compared to 4,100,000 bushels in the previous year. Calculating the quantity of grain held back by farmers to satisfy their 1960 sowing and stock feed requirements, the Commonwealth Statistician estimated that the harvest totalled approximately 66,000,000 bushels, from 3,100,000 acres sown for grain; an average yield of 21.3 bushels per acre. This, if confirmed by final statistics, would be a record per acre yield for this State.

PREMIUM WHEATS

Approximately 6,192,000 bushels (10.3 per cent.) commanded a premium; an all-time record.

Premium varieties most in demand were, in order, Gabo (55 per cent.), Koda (16.7 per cent.), Festival (9.4 per cent.), Sabre (6.3 per cent.), Spica (5.3 per cent.), and Charter (2.1 per cent.).

Highest individual premium bid was for one lot of Festival (7s. 9d. per bushel); only 3d. below the record premium on wheat grown in New South Wales.

Highest average premium was 3s. 7d. per bushel, for a relatively small quantity of the durum variety, Dural.

Average price for all premium receivals was 2s. 5d. per bushel.

BULK HANDLING OF PREMIUM WHEATS

This new system was commenced during the year, at three north-western centres. It operated satisfactorily. Under the new system, highest premiums were paid at these receival points for Gabo-type varieties, top premiums less 15 per cent. were paid for wheats of the hard-blending (Festival) types, and no premium for soft types.

FAIR AVERAGE QUALITY (F.A.Q.)

Responsibility for fixing and declaring the F.A.Q., previously carried out by the Chamber of Commerce, was taken over by the Australian Wheat Board.

For 1959-60, two F.A.Q. standards were declared, one for northern wheat at 62 lb. per bushel Schopper weight and one for southern and western wheat combined—at 61½ lb. per bushel. Standards were declared for lightweight wheat in addition to the F.A.Q. standard.

VARIETY POPULARITIES

Gabo, the New South Wales bred variety, is now not only the most widely grown wheat in this State, but also in South Australia, Western Australia, and Australia as a whole.

The leading varieties in New South Wales are now (1957-58 statistics), Gabo (26.2 per cent.), Bencubbin (19.2 per cent.), Glenwari (15.3 per cent.), Kendee (8 per cent.), and Festival (6 per cent.).

Rapidly increasing popularity of the poor quality variety, Glenwari, is a matter of considerable concern.

The rust-resistant variety, Festival, bred by this Department, secured best points for bench characters in the Hard Blending Wheat Class at the Royal Easter Show, with a bushel weight of 70 lb.

DURUM WHEAT

Production of the new durum wheat variety, Dural, bred by plant breeders of this Department, increased. The interest of a firm of flour millers located in the north-west, and of a large firm of food processors with headquarters in Melbourne, have ensured that within a year or two sufficient Dural will be grown to at least meet the spaghetti requirements of the processing firm concerned.

Dural, though selected specifically for production of high-quality macaroni-type semolinas, compared favourably on the more fertile soils of the north-west with some of the currently grown bread wheat varieties.

Over 600 acres of Dural were sown in 1958 in the north-west. Yields of up to 14 bags per acre were obtained, and the previously mentioned north-western milling firm purchased approximately 17,000 bushels at a premium.

In 1959, additional to any seed held back by farmers for sowing, the firm, now installing a semolina plant into its Tamworth mills, supplied almost 700 bushels of seed to fifteen north-western growers. The produce from this year's harvest will be bought at premium prices.

No extensive breeding programme is planned for durum wheats at present. The resistance to stem rust of several varieties in the world collections is being studied; and crosses with such resistant varieties as Langdon, Ramsey and Towner have been made.

WINTER WHEAT

Production of winter wheats, particularly in the north-west, received considerable impetus by the advance of the new variety Winglen into commercial cultivation. Winglen was produced under the combined University of Sydney-Department of Agriculture northern breeding programme.

Seed of Winglen is not yet sufficient to satisfy all demand, but pure seed production was commenced in 1958. It seems certain that cultivation of this type of wheat, which can be sown very early in the season, will expand throughout the State.

Winglen has desirable field and baking quality characteristics, and action is being taken to incorporate a greater degree of rust resistance into the variety.

BISCUIT WHEATS

A leading biscuit manufacturer again co-operated with the Department in testing thirty samples of eleven varieties of wheats from the south of the State, to determine their suitability for biscuit manufacturing purposes. The Tasmanian variety Macquarie was included in the 1958 trials and is being further tested this year.

Tests of the 1958 harvest samples showed the effect of environment. They indicated that wheats suitable for milling into the various grades of biscuit-making flour are available in this State, but to make the best use of the grain available it would be necessary to purchase individual parcels

of wheat—in much the same manner as high-quality wheat is purchased, for milling into bread-making flour, from northern wheat-growing areas.

WHEAT IMPROVEMENT

In the South of the State.—The southern wheat improvement programme was conducted by the Agricultural Research Institute, Wagga. Seasonal conditions in 1958 were difficult, and at Wagga and Temora it was necessary to treat yield figures with caution.

The crossbred R.D.R. x 4 Insignia 49, was named "Heron". This variety will be considered a possible replacement for Insignia and Koala in the southern districts.

Two promising unnamed crossbreds, M972 and W412, were included in 1959 Farmers' Experiments in the south, and seed of these two crossbreds is being increased.

In the North of the State.—1958 proved a most valuable year for the co-operative work carried out by this Department and the University of Sydney in breeding and testing wheat varieties; and demonstrated the urgent need for suitable varieties to counter frost and rust—the two major causes of yield loss in this zone.

Helped by the stem rust epidemic, considerable progress was made in the elimination of susceptible material.

Replicated yield trials were sown at Tamworth Experiment Station and Curlewis Plant Breeding Station, and on farmer co-operators' properties at Narrabri, Gunnedah, Nea, Spring Ridge, Tamworth and Winton.

Sowings of early generation material were also made at these centres, as well as at the Castle Hill Research Station and Hawkesbury Agricultural College.

Selections for disease resistance were made at the latter two places. One early-maturing line among the back-cross material has proved particularly promising. Steps are in hand to increase it for distribution as a variety. This line (1153.142) is of the breeding Gabo 7 x Montana x Kenya 117A. It has yielded well in the north, and combines both leaf and stem rust resistance. Its baking quality is equivalent to Gabo. It also closely resembles that variety morphologically.

Basic studies continued at the University of Sydney on the mode of inheritance of resistance to stem rust and the combining of different types of resistance in one variety.

The 1958 season saw the advent of the new custom-built plot harvester. With the exception of one or two faults, to be corrected before next harvest, the machine proved satisfactory. It will make a very valuable contribution to yield-testing technique in the north-west.

WHEAT QUALITY ACTIVITIES

The Commonwealth Production Committee on wheat quality, in which this Department is represented by the Special Agronomist (Cereals), collected additional information. It reached the stage of final report on findings, for presentation to the Australian Agricultural Council.

In co-operation with Chemist Branch, Division of Science Services, arrangements were made to test wheat samples from Farmers' Experiments throughout the State and from variety trials at Experiment Farms in the wheat belt. Numerous baking tests were carried out in addition to the routine milling and physical dough testing. These provided valuable information on the baking quality of promising new material under field test.

NEW LEGISLATION AFFECTING WHEAT INDUSTRY

The Wheat Industry Stabilisation Act, 1958.—This was assented to in October, 1958. It replaced the Act of 1954 and will remain in force until November, 1963.

Continuance of wheat stabilisation plans has introduced a degree of stability to the wheat industry unknown prior to World War II.

New International Wheat Agreement.—This will become effective in August, 1959, for a three-year period. Continuance of this agreement will have a further effect in stabilising wheat prices, and the more so through, in the new agreement, participation by the United Kingdom—the world's largest wheat importer.



"Southern Wheat Improvement Programme"

Promising crossbreds and new varieties developed by the Agricultural Research Institute, Wagga, are being field tested.

This year, two new crossbreds showing promising yield and quality improvements for southern areas of the State's wheat belt have been distributed to several centres for final field tests prior to a decision on their release.

(Photo—Division of Information Services.)

The Wheat Research Act, 1957.—This, with which was associated the Wheat Tax Act, 1957, came into full operation during 1958; when disbursements were made from funds of both the Commonwealth Wheat Industry Research Council and the N.S.W. Wheat Industry Research Committee.

WHEAT EXPERIMENTS—VARIETY TRIALS

Wheat variety trials on farmers' properties and on the Department's Experiment Farms throughout the wheat belt again provided valuable information on the performance of different varieties. In 1958, wheat variety trials were conducted with 59 farmers in 23 Agronomists' districts; testing a total of 22 varieties.

In the south of the State, new varieties tested in 1958 included the recently named variety "Heron", bred at the Agricultural Research Institute, Wagga; two promising cross-breeds—as yet unnamed—from the Agricultural Research Institute and Temora Experiment Farm; the New South Wales bred winter wheat Wingen and a sister line of the same variety; Victorian varieties Olympic and Beacon; and the Western Australia variety Moora.

In the north of the State, newer varieties tested include Wingen, Koda, Sabre, Claymore, Moora, and the durum variety Dural.

Of the 59 wheat variety trials conducted on farmers' properties in 1958-59, 44 (75 per cent.) were replicated and randomised. The results were particularly valuable in indicating the effect of stem rust and frosts on variety yield performance.

In northern districts, the rust resistant varieties Festival, Spica and Glenwari were outstanding, and the durum variety Dural performed well. Sabre and Celebration yielded satisfactorily where rust infection was not severe. Gabo, Koda and Broughton returned low yields, and the new variety Claymore was generally disappointing. At Gunnedah, a flag smut was heavy on the susceptible varieties Gabo, Broughton and Claymore.

In central districts, the outstanding variety was Glenwari. This was top yielder in practically every trial in which it was included; due in a large degree to its combination of rust and frost resistance. Olympic, Heron, Sabre and Beacon performed well where stem rust was not a factor. Gabo and Festival yielded well in late sown trials, but Claymore gave only a mediocre performance. At Trangie Experiment Station, where stem rust reduced yields, Moora, Glr. Dde, x Glr. Benc. M972, Carl. P4 Bga. C18767, and Glenwari performed well.

In southern districts, very good yields were obtained from Olympic, Sherpa, Heron and Bencubbin. Olympic performed particularly well along the Victorian border. Of the later-maturing varieties, Sabre yielded well but was generally inferior to Bordan. Although Glenwari performed well where tested, it was not as outstanding as in the central districts. Beacon gave good all-round results at Yanco and Leeton.

SOIL FERTILITY AND ROTATION EXPERIMENTS

The Condobolin Soil Fertility and Rotation Experiment has now completed its third year. In 1958, although frost caused an estimated yield reduction of 10 per cent. in the wheat plots, good final yields were obtained: 26 bushels per acre for the long fallowed plots and 22 bushels per acre for the short fallowed plots. Protein content of the wheat samples ranged from 7.6 per cent. to 12.3 per cent. A total of four grazings was obtained from the grazing oat plots during the year—greatly superior to the other grazing plots. A more satisfactory method of pasture sampling has been devised which has simplified this aspect of the work.

At Trangie Agricultural Experiment Station, the yield of wheat after volunteer pasture was greater than after lucerne; because the lucerne is much more difficult to destroy, and thus competes with the growing crop.

Experiments to test the effect of time of ploughing on wheat yield and regeneration of medics (Trangie), and to test the best method of changing from pasture to arable phase (Condobolin) were concluded after the 1958 harvest. The results are being prepared for publication.

At Temora Experiment Farm, a redesigned stubble treatment trial was commenced on permanent sites and incorporating use of nitrogen. Pending analysis of the yields, results indicate lack of response to nitrogen applied three weeks before sowing. They also suggest that the disc treatments are superior.

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WHEAT FERTILIZER EXPERIMENTS

To gather information on the nutrient requirements of wheat belt soils, a series of Uniform Wheat Fertilizer Trials (W.U.F.T.) was commenced at 19 centres.

Results from a "rate of superphosphate" trial, on wheat after pasture, at Cowra in 1958, were non-significant. This experiment will be replaced by a W.U.F.T. in 1959. At Condobolin, in a "rate of superphosphate" trial on wheat, sown on a permanent site, there was a marked difference in favour of the 56 and 84 lb. per acre applications compared to the nil and 30 lb. per acre plots.

FIELD WHEAT COMPETITIONS

Six Divisional Championships were conducted by the Royal Agricultural Society, compared to five the previous year. Championship field judging of the winning crops in local competitions was carried out by officers of this Division.

Crops were entered in 65 local competitions, compared to 23 in the previous year. The continuing popularity of these competitions was evidenced by the fact that 893 individual crops were entered in local competitions. Entries in these competitions were far in excess of the numbers received in recent years, and were further evidence of the increased general interest in wheat.

Highlights of the competitions were the popularity and good performance of the non-recommended rust resistant variety, Glenwari; the high yields of the winning crops in all districts, despite rust and frost damage; the good recovery of stem frosted crops; the breakdown in resistance of Gabo to stem rust in central and southern districts; and the resistance of Eureka to prevalent strains of rust despite its breakdown in resistance some years ago.

In the Junior Farmer Wheat and Oat State Championships, increased entries were received in both wheat and oat championships. Twelve entries, from eight clubs, were judged for the wheat championship (six, from four clubs, in 1957-58), and four entries from three clubs in the oat championship (only one competitor in 1957-58). Best wheat entry was a crop of Glenwari yielding 49 bushels per acre. The championship oat crop, Belar variety, yielded 56 bushels per acre.

Oats

Production Figures.—Conditions were very favourable for oats. Actual acreage and yield figures are not available, but production has been estimated at some 19,000,000 bushels of grain from 1,000,000 acres; and 180,000 tons of hay from 140,000 acres. Total sowings of oats for all purposes were approximately 1,600,000 acres; the highest ever.

It is of interest to compare those figures with those of the previous year, 1957-58. Then, as a result of extremely dry conditions, after a total sowing of 1,222,000 acres, only 3,944,000 bushels of grain and 78,000 tons of hay were harvested.

Variety Popularities.—There has been little change in the status of leading oat varieties. Farmers are still sowing mainly the old varieties Belar (54.8 per cent. of the acreage), Algerian (26.8 per cent.) and Fulghum (6.4 per cent.).

Oat Experiments—Variety Trials.—Oat variety trials have been conducted at Experiment Farms and on farmers' properties—with 31 farmers, in 20 Agronomists' districts; testing a total of 23 varieties.

In farmers' experiments, the best performances among the new varieties were by Avon, Osage and Fulmark, whilst Kent yielded well for grain at some centres. Dale, Burke and Fulghum gave the best results of the more established varieties. Garry and Acacia yielded well for grain on the northern tablelands.

On Experiment Farms, Yates Algerian and Victorgrain 4 gave outstanding grazing yields plus a good recovery for grain. Avon was best yielder for grain and at the same time gave good early grazing. A good performance for grain was also given by Orient, Osage, Fulmark, Dale, Cokers Fulgrain, V.R. Bke. W4464, and V.R. Bke. x WF W4465. On the northern tablelands, a Fulghum x Garry line provided excellent grazing and grain yields in a preliminary trial. In coastal grazing trials, the late maturing Klein 69B continued to yield well, and the earlier maturing varieties Fulgrain Strain 6, Fulghum and Victorgrain Strain 4 gave best results.

Of the thirty-one oat variety trials conducted on farmers' properties, twenty-one were replicated and randomised; a marked improvement on the proportion in earlier years.

Oat Improvement Work.—The northern and coastal oat improvement programme centred at New England Experiment Farm was expanded; to test promising material at Curlewis and Pallamallawa in the north-west, in addition to Tamworth and Glen Innes.

Crown rust testing was continued at Grafton Experiment Farm. There the reactions of 200 varieties and crossbreds to both crown and stem rust were recorded.

Combined stem and leaf rust resistances have now been incorporated into Algerian; with seed for an F3 population now available.

At New England Experiment Farm, the Garry resistance was maintained very strongly throughout the whole of the artificially assisted stem rust epidemic, but the variety cannot now be described as "immune".

Work was continued to combine the stem rust resistances of Richland, White Tartarian, and Garry with the desirable grain character of Belar. Less success in oat crossing was obtained during the rust epidemic season of 1958 than in the dry 1957 season, although moisture and techniques were both improved.

Smut testing was confined to those lines which underwent great percentage determinations.

A Fulghum x Garry selection was markedly superior at Glen Innes to all rust susceptible lines.

V.R.A.F. W4514 gave excellent grain recovery yields at New England Experiment Farm, and V.R.A.F. 4570 topped the grazing yields both at Glen Innes and Tamworth.

Of varieties tested at Tamworth and Curlewis for north-western conditions, most promising is the V.R. Bke. F.W.F. selection, W4587. This line, although stem rust susceptible, has performed well for both grazing and grain in the north-west. It appears to be immune to smut, and is better than Belar in resistance to lodging and shattering.

The new oat variety, Fulmark, bred at Temora Experiment Farm, has shown such promise that it has been included in 1959 sowing recommendations for a large area of the State.

Rate of Seed and Fertiliser.—Experiments were commenced in the Boorowa district and at Cowra Experiment Farm, to study the effect of different combinations of seed, nitrogen, and phosphorus on yield and quality of the grazed oats.

Barley

Production Figures.—Production statistics for the 1958-59 season are not yet available, but it appears likely that the area sown for grain and the total production will be records. Previous record area under barley for grain was 69,000 acres (in 1957-58); and previous record production was 1,120,370 bushels (in 1955-56).

Cereal Rye

Production Figures.—Statistics for the 1958-59 season are not yet available; but higher than usual acreage and yield are anticipated, despite frost damage in some areas.

There was a good demand by local manufacturers for rye grain grown in New South Wales. They could handle a much bigger volume of grain than is at present being grown here. However, many farmers are wary of increasing their acreage; because of the lower per acre yield of this cereal, and the uncertainty of grain prices.

Seed Stocks Maintained.—Seed stocks were maintained; of the Weethalle strain at Trangie, of Strain 8 at Cowra, and of Black Winter at New England Experiment Farm.

A small quantity of seed of Improved N.I.A.B. rye, which has given a good performance under grazing conditions in New Zealand, was sown late in 1958 at Leeton. It did not survive. Residue seed has been sown this year.

Registered Seed Production—Wheat, Oats, Barley

Supplies of recommended and promising varieties of wheat, oats and barley were maintained and distributed through Registered Seed Growers.

The Registered Seed Production Scheme was revised to make it more effective and to ensure that Registered Growers undertake to abide by certain conditions in return for the seed provided. The revised scheme commenced operation with the 1959 sowing season.

Less acreage was used in 1959 for the production of Foundation Seed on Experiment Farms. These include (with 1958 figures in brackets) 213 acres of wheat (320), 200 acres of oats (195), and 18 acres of barley (20), on nine Experiment Farms and Stations.

The Foundation Seed sowings of recommended and promising varieties in 1959 (1958 figures in brackets) comprise 30 (29) wheat varieties, 23 (22) oat varieties, and 5 barley varieties.

Associated with production of Foundation Seed, initial selection and preliminary increase of wheat and of oats were carried out at Temora Experiment Farm, of barley at Wagga Agricultural College, and of some oat varieties—suitable for northern conditions—at New England Experiment Farm.

In 1958 and 1959 (in brackets), 111 (114) Registered Seed Wheat Growers, working under the supervision of 20 (22) District Agronomists, using Foundation Seed supplied by the Department, undertook seed increase of 17 (20) wheat varieties; 96 (90) Registered Seed Oat Growers, working under the supervision of 22 (19) District Agronomists carried out seed increase of 12 (14) oat varieties; and 8 (9) Registered Seed Barley Growers in 6 (8) District Agronomists' areas undertook pure seed production of 4 (4) varieties.

Maize

An increase was noted in acreage sown to maize in some inland districts. Overall area harvested for grain was above average. Due to good seasonal conditions and a surplus of maize grain, prices were low. At the end of the year, much more grain than usual was being stored on farms; and the use of grain on the farm where it was grown was increasing.

Hybrid Maize Improvement Programmes.—This work was continued at the New England and Grafton Experiment Farms. An Agronomist was appointed to Grafton Experiment Farm for research on hybrid maize.

Summer floods interfered with the Grafton programme and some breeding material was lost. The year's work in general was successful. The objective of breeding higher yielding hybrids, with greater disease resistance, was advanced a stage further.

Demand for inbred seed, for production of maize hybrids by seed producers, increased. Satisfactory progress was made in production of inbreds. The Department was able to supply seed of all parent material required.

Progress was made in developing a waxy maize. This produces starch with special properties for manufacturing purposes. Production of a waxy maize hybrid is interesting some manufacturing firms. Seed should be available for initial testing in 1961.

Hybrid Maize Certification Scheme.—This Scheme, administered by the Department, continued to expand; 22,000 bushels of seed were certified during the season. The seed was produced on 587 acres by 65 individual growers; 316 acres of early maturing hybrids, 15 acres midseason, and 256 acres of late maturing hybrids.

Some 60 per cent. of the total hybrid maize seed produced comprised hybrids released by the Department of Agriculture. Hybrids developed by the Department continued to produce high yields.

Inbred Seed to Growers.—Eight more landowners purchased inbred seed from the Department, to commence hybrid maize seed production on their own account. This policy of releasing inbreds to individuals has increased the supervisory work, made more difficult because the growers are wide-scattered.

Hybrid Maize Seed Growers' Co-op.—Seed producers have difficulties because of over-production. Some 3,000 bushels of seed were held over during the past season. In an attempt to stabilise production, a growers' pool for sale of late maturing hybrid seed was formed by the Hybrid Maize Seed Growers' Co-op.

District Maize Yield Trials.—Fifty-four district trials for grain were sown; and ten trials were sown to test different hybrids for fodder production.

A very early-maturing hybrid being developed at the New England Experiment Farm created some interest in trials in short-season districts where maize cannot normally be grown. This hybrid's yielding ability proved disappointing, however, when compared with others used commercially.

Maize Fertiliser and Spacing Tests.—Fifteen trials to study the effect of different fertilisers and spacings of maize, were established. Some interesting results are expected.

Molybdenum in Maize Nutrition.—Poor growth of crops in some areas was found to be due to molybdenum deficiency, and investigations on molybdenum requirements of maize were commenced. These indicated that where maize seed is produced on soil deficient in molybdenum and this seed in turn is planted on molybdenum deficient land, a severe molybdenum deficiency occurs. The crop dies or is badly checked unless corrective measures are taken.

Sweet Corn

Work with sweet corn continued at Yanco Experiment Farm. Results were very satisfactory.

Canning Tests of Hybrids.—With the co-operation of Leeton Cannery, promising sweet corn hybrids under trial at the Yanco Experiment Farm were given a thorough test for canning.

Some unnamed hybrids canned very satisfactorily, but further testing is required to prove whether they are better than the at present popular commercial varieties Iochief and Golden Cross Bantam.

Inbred Seed to Growers.—Inbred material necessary for production of commercial sweet corn hybrids was maintained at Yanco Experiment Farm, and distributed to seed producers.

Sweet Corn Seed Certification Scheme.—The seed acreage sown was similar to that of the previous season and proved ample to supply the needs of canning firms interested in the crop.

Popcorn

Hybrid Popcorns Superior.—Improvement work with popcorn continued at the New England Experiment Farm. Commercial crops of hybrid popcorn produced by the Department gave satisfactory results.

It has been shown that hybrid popcorns, now available, are superior to the open-pollinated varieties.

Sweet Sorghum

Improvement Work, and Foundation Seed Production.—Continued at the Grafton Experiment Farm and Hawkesbury Agricultural College, with the varieties White African, Sacaline and Early Orange. Growers in general and seed firms consider that much improvement has been made in the quality of sweet sorghums by selection work during the past few years.

Certified Sweet Sorghum Seed.—Thirty growers produced 6,000 bushels of Certified sweet sorghum seed, from 200 acres sown.

Grain Sorghum

Introductions and Trials.—Ten district trials with grain sorghum varieties were carried out. The varieties Caprock and Alpha continue to perform satisfactorily in all districts.

The work of testing and seed-increasing promising new introductions was continued at the Yanco and Leeton Experiment Farms.

Pure-Seed Production.—There was a good demand for pure seed produced at the Yanco and Leeton Experiment Farms. Approximately 100 bushels were distributed. This quantity was sufficient to sow 650 acres throughout the State.

New Variety Released.—A new variety, Redbine 66, was released to growers and performed satisfactorily.

Progeny Testing; towards a Seed Certification Scheme.—Progeny testing of grain sorghum varieties was carried out in co-operation with two landowners in the north-west; to obtain Foundation seed for establishment of a Grain Sorghum Certification Scheme.

Hybrid Grain Sorghum.—Hybrid grain sorghum was grown commercially in Australia for the first time during the year. Two hundred pounds of hybrid seed were imported by a private Company and sown in quarantine under the supervision of Departmental officers. Hybrid grain sorghum is reported to give greater yields than varieties at present in use.

Work continued at Yanco Experiment Farm towards producing a hybrid grain sorghum. Seed of the necessary inbreds, imported last season, have been increased; and material is now available to commence a breeding programme.

Waxy Sorghum

Waxy sorghum, the starch of which has special properties for manufacturing purposes, was again produced at the Leeton Experiment Farm.

Seed was made available to an interested firm and it is now undergoing a thorough test in the canning industry. The variety made available was Waxy Combine Kaffir. It yielded extremely well.

Sudan Grass

S.S.6 Sweet Sudan Grass.—This has now largely replaced common Sudan grass in New South Wales.

Seed Scheme.—The Approved Seed Scheme which operated for Sudan grass was discontinued because of the low purity standard of crops throughout the State and the loss of identity of the seed once approved.

Action was taken to initiate selection work on Sudan grass for improvement in seed quality and the possibility of commencing a Seed Certification Scheme.

Columbus Grass (*Sorghum alnum*)

Large Acreage Now Sown.—Many landowners are now intensely interested in *Sorghum Alnum* because of its great grazing potential. Large areas were again sown. It is estimated that 50,000 acres are now grown annually in New South Wales.

Improvement, and Investigational Works.—Grafton Experiment Farm has continued the improvement work. Investigational work has been undertaken also at Yanco Experiment Farm and Trangie Experiment Farm.

"Straw-coloured" Seed Selections.—This seed, with which it is hoped to distinguish *Sorghum alnum* seed from that of Johnson grass, was distributed from Grafton Experiment Farm to the C.S.I.R.O., the Trangie Experiment Station, and a co-operating landowner in the north-west, to test under field conditions.

It was found that the selections lacked vigour when compared to the normal strain of *Sorghum alnum*. Further work is necessary before a "straw" seeded strain would be available.

Millets

Broom Millet Selection.—This work continued at Bathurst Experiment Farm. A new variety, OKAW, was distributed to millet growers for trial.

Promising Fodder Millet Introductions.—Introduced promising lines were successfully seed increased.

Rape and Kale

Variety trials were carried out in four districts and at the Hawkesbury Agricultural College. In some districts these crops have been popular for sheep and cattle grazing.

Soybeans

New England and Grafton Experiment Farms continued work on soybean varieties. From further introductions, no variety giving outstanding results under Australian conditions has been observed.

Some manufacturers' and landowners' interest in soybeans is still keen; but no more than one acre would have been grown commercially in the State. The low yielding ability

of available varieties and the susceptibility to seed-shattering, prevent the soybean from becoming at present a popular commercial crop.

Cowpeas

Work with cowpeas was intensified. The crop was tried successfully in areas in which it had not previously been grown. New varieties, Malabar and Blackeye 5, proved highly resistant to stem rot. This disease in the past has affected areas of the commonly used variety Poona.

A few landowners again interested themselves in the production of seed. Excellent quality seed was produced in the Moree and Coonabarabran districts, in much greater quantities than that of the previous season. Yields of twelve to fifteen bushels of seed per acre were obtained.

Lupins

Lupin trials were undertaken at Hawkesbury Agricultural College and at the Wollongbar Experiment Farm, to test their grazing potential.

A sweet lupin variety, Borre, was made available for the first time. It has drawn interest in the grazing tests.

Vetches

Interest in vetches (Golden Tares) has intensified, particularly in the north coast region. Acreage has increased by as much as 300 per cent. in some districts.

Possibility of producing vetch seed in the north-west was tested; but the growth was poor and practically no seed was set, possibly due to the adverse season.

Russian Comfrey

Russian Comfrey work continued at Grafton Experiment Farm, and the plant was kept under observation in most districts.

Where irrigation or good soil moisture conditions were available, Russian Comfrey proved useful for cutting and feeding to stock.

Grazing trials at Grafton Experiment Farm have shown that the plant is not relished by stock for grazing.

Protein analyses made periodically during the year indicated a protein content range from 10 per cent. to 25 per cent.

Greater Interest in Miscellaneous Crops

Decline in the price of wool, and the greater difficulties experienced by Australia in satisfactorily selling export surpluses of various other primary products, have emphasised the need for greater diversification in primary production.

The Commonwealth desires production of import saving crops; and linseed, tobacco, and cotton have assumed increasing importance. An outstanding feature of the past year has been greater interest by farmers in linseed, cotton, peanuts, and tobacco.

Tobacco has assumed greater importance, as an import saving crop. Action to increase the amount of Australian leaf used by manufacturers was continued.

The fall in returns from wheat has been responsible for wheat farmers displaying a keen interest in linseed. During the past season a greater area was sown to this crop than in any year since 1951. Wholesalers have guaranteed a price of £70 a ton, Sydney. This price is an effective inducement to farmers.

Farmers, particularly inland farmers to whom irrigation is available, showed increasing interest in peanuts; a crop previously confined largely to coastal districts.

Cotton experiments commenced this year at the newly-established Narrabri Experiment Farm and demonstrated yields of some 1,700 lb. per acre; an encouraging pointer for success of commercial cotton growing in New South Wales.

Rice

Plant Breeding, and Experiment Work.—Plant breeding and experiment work was continued at Yanco Experiment Farm; whilst pure seed of the variety Caloro was produced at Leeton Experiment Farm.

Additionally, variety yield tests, field trials with fertilisers, trials for control of insects and weeds, and "methods of sowing" experiments, were conducted in the rice producing areas of the M.I.A. and the further-south irrigation districts.

There are two outstanding problems. Their solution will have a vital effect on the prosperity of the rice industry in New South Wales. The first is the production of a variety with a short growing season, early maturity, and a long grain. The second is the imperative need to resolve the problem of sun-cracking in rice.

Industry Support for Research.—Research work has been greatly assisted by funds paid to the Department by the rice industry. These have resulted in the appointment of field assistants and a chemist. They and the rice breeder are located at Yanco Experiment Farm, and have a well equipped laboratory—provided from rice industry funds.

The Variety Improvement Problem.—Until the close of the present rice growing season it was anticipated that the answer to this problem was at hand. Departmental trials in previous years had indicated that the variety "Hungarian" had the requisite long grain, short season, early maturing habit of growth and, moreover, was capable of very high yields.

During 1958-59, extensive yield trials were sown on a commercial scale and in all cases the variety's field performance fulfilled Departmental expectations. Yields averaged over two tons to the acre, and the new variety was as much as three weeks earlier than the standard, mid-season Caloro at present being grown by the industry. The early maturity is of the greatest importance in the more southern rice growing areas, where the frost free period demands a quick maturing variety.

Hope that "Hungarian" would prove to be the suitable variety for commercial production has been negated by milling tests.

The polished grain is too starchy; it also fractures easily, producing a high percentage of cracked grain. This outcome has been most disappointing.

Calrose was promising in tests, at Yanco Experiment Farm and in co-operation with growers. It has a semi-long grain, and could possibly serve as an intermediate step—meeting the current commercial demand for a longer grained rice, to hold the market for M.I.A. growers until a long grained variety more suitable to our conditions has been produced.

Calrose has some very desirable characteristics, and rice processors and manufacturers of cereal foods have expressed a very definite preference for its grain. They have declared it to be much more suited to their purposes than is the widely grown Caloro II.

The Sun-cracking Problem.—Research continued at Yanco Experiment Farm, to determine the basic causes of sun-cracking in rice.

One line of work was determination of the possibility of correlations between the protein content of the grain and its predisposition to sun-cracking. The results were negative.

It is increasingly thought that solution of the problem will eventually rest with the breeding of strains resistant to the sun-cracking factor. Breeding, with this aim, is proceeding at Yanco Experiment Farm.

Concurrently, there is research on physiological characters of the rice plant and its grain; to reveal possible other lines to follow in working for an answer to the sun-cracking problem.

Rice Yields Progressively Higher.—A rice "report" would be remiss without mention of the progressively higher yields.

For the five-year period 1924-25 to 1928-29, M.I.A. farmers produced average yields of 1.40 tons per acre. In the period 1944-45 to 1948-49, the average of yields rose to 1.76 tons per acre; but the average for the five-year period 1954-55 to 1958-59 showed further increase, to the record of 2.37 tons per acre.

A record yield in 1938-39 of 2.23 tons per acre, for the total area sown to this crop in the M.I.A., was not exceeded for eleven years—when an average of 2.35 tons per acre was achieved in 1950-51.

However, during the past ten years the original 1938-39 record has been exceeded in no less than seven seasons; indicating on the one hand the increased efficiency of growers and, on the other, the results of research and extension work by this Department—in irrigation layout, soil fertility, varietal selection and provision of pure seed for growers.

Aerial Sowing and Sod-seeding of Rice.—The Department has continued to explore the possibilities of lowered production costs; by means of aerial sowing into prepared but flooded seed-beds, and by direct sod-seeding of the rice seed into pasture land.

Aerial sowing is widely practised in America, but results in the M.I.A. have not yet shown that aerial sowing will yield the same advantages here. Further field trials, with fixed wing and helicopter aircraft, have been arranged for the coming season.

Sod-seeding, however, does offer more encouragement; as a sowing method to lower costs of production.

By sod-seeding rice into pasture bays, farmers obtain the additional benefit of a longer grazing period of the pastures into which the rice is sown, and are able to dispense with the prior cultivation of the soil. By omitting this land preparation, savings of £7 and £8 per acre were made.

It has also been found that the sod-seeding method gives substantial control of weed growth. Again, the comparatively firm soil of the established pasture permits sowing to take place under a wide range of soil moisture levels. In addition, the method provides much firmer soil conditions for harvesting machinery.

One minor difficulty has been encountered; Chironomid larvae are more prevalent in sod-seeded crops, where the organic matter, from pastures, is naturally very high. The larvae can be controlled by use of D.D.T.

Cotton

The Department has commenced an intensive research programme with cotton (and other crops) at the new Narrabri Experiment Farm—opened in 1958. In spite of the unfavourable summer experienced, irrigated cotton grown on the Farm yielded up to 1,700 lb. per acre. None of the Experiment Farm personnel was previously familiar with this crop. It was a most encouraging first season result.

Linseed

Linseed has had a varied career in this State, but has been grown profitably by some farmers in the north-west for many years. Difficulties of production, compared with wheat growing, have prevented it from becoming popular. However, wheat prices have forced growers to give linseed consideration; and it is anticipated that almost 12,000 acres of linseed will be sown in New South Wales this season.

Tobacco

Industry Funds and Assistance for Research and Extension.—The importance of this crop as one capable of improving Australia's balance of trade has long been recognised. More recently, growers and manufacturers agreed to add annual quotas of funds to those already given by Commonwealth and State Governments. This money has been used for tobacco research and extension work, and this year £15,870 will be available to the Department for these purposes.

The Department is enjoying the support forthcoming from growers, and from tobacco manufacturers.

Great co-operation has been forthcoming from the latter section of the industry. W. D. and H. O. Wills have volunteered full assistance in testing prospective commercial tobacco for manufacturing and smoking quality, and by field trials of Departmental material on their Queensland property at Tinana Creek.

In addition, State Departments of Agriculture in other States, and the C.S.I.R.O., indicate their willingness to assist by conducting Commonwealth-wide tests of mould resistant lines.

Blue Mould-Resistant Varieties.—As a result of research work commenced by this Department many years ago, commercial tobacco varieties resistant to blue mould have been developed. Tests have indicated that a variety or varieties of good smoking quality will soon be released to growers.

Transfer of Research to Glen Innes.—The tobacco research work previously located at Bathurst Experiment Farm was transferred to New England Experiment Farm, Glen Innes. A glasshouse, laboratory, and office accommodation have been provided there, from the special funds. It has also been possible to appoint a plant pathologist and a field assistant for tobacco research.

Ramie

Ramie is a fibre crop of promise; possibly as an alternative crop for irrigation farmers. It has been grown in Asian countries for many centuries.

Its fibre is stronger than that of flax, more absorbent than cotton, and also possesses an almost mercerized sheen. It is extraordinarily versatile, being used in Asia for everything from fine textiles to cordage and sailcloth. Asian production methods would be wasteful and uneconomic under our conditions.

For the past fifteen years, the Department has conducted research and field experiments with ramie, in co-operation with a private processor who has patented a treatment for separating the fibre from surrounding bark and resins.

The experiments have reached the stage where consignments of processed fibre have been sent overseas and been carded and spun by overseas manufacturers. The reports encourage a prediction that ramie could become an important fibre crop in Australia. Work is being continued on the north coast and in Irrigation Areas.

Other—Minor Crops

Some breeding and experiment work was done with peanuts, safflower, castor beans, luffas, sunflowers and several other minor crops.

This work has been exploratory; and included the testing of introduced varieties to ascertain their potential under Australian conditions.

Vegetable Section—General

The past season was most favourable for vegetables. There were ample supplies, of good quality. The heavy production was due in part to the entry of new growers. It was a difficult year for the regular, main crop vegetable growers; because of the new growers, and the low prices.

The vegetable research programme was continued. Several new lines of investigation were undertaken.

Progress was made in breeding improved varieties of French beans and hybrid tomatoes.

A new French bean variety, College Pride, developed at Hawkesbury Agricultural College was released in March, 1959.

A new *Fusarium* wilt-resistant tomato hybrid, Kokomo x Rouge de Marmande, gave good results under Hawkesbury College conditions.

An additional glasshouse has been erected at New England Experiment Farm to allow a further expansion of the potato breeding programme; particularly in the crossing and disease testing sections. Much parental material was classified and intensive crossing undertaken. This should result in rapid development of varieties of high yield, quality and disease resistance. Some of the crossbred material now in advanced generations has given promising results in district variety trials.

At Bathurst, transfer of area leased to the Department by Gordon Edgell & Sons Ltd., from Bradwardine to a new area at Alloway Downs, has provided better facilities for extensive research on tomatoes, beans, peas and cauliflowers.

At Yanco Experiment Farm the rockmelon breeding programme was expanded to include breeding for resistance to *Fusarium* wilt and also to a new strain of powdery mildew which has recently shown up in the M.I.A. Parental material resistant to both these diseases has already been introduced from the U.S.A.

There appears to be an assured market for field beans (Navy beans) at a payable price and this industry has expanded in the New England district. To assist production, the breeding of early maturing, erect growing varieties to withstand the wet weather often experienced at harvest time has been undertaken. Defoliation tests to facilitate harvesting have also been undertaken.

Potatoes

Breeding.—Crossing was carried out in the glasshouse at New England Experiment Farm, again using the technique of planting on bricks, to promote flower and berry formation. One hundred and seventy crosses were made, producing a harvest of over 1,000 seed balls. Female parents used included B595-76, Saco, Delus, Saranac, and Sebago from the U.S.A., Southesk from Scotland, and the local varieties Adina, Crana, S2654 and Mainguy. Male parents used mostly were Cherokee, Merrimack, B2368-4, Kennebec, Menominee, and Katahdin from the U.S.A. and the local varieties and seedlings Adina, S2865 and S2654.

Some 14,000 seedlings were grown and harvested in the glasshouse. The most promising crosses were B595-76 x Awaba, S2821 x Merrimack, S2782 x Merrimack, S2864 x Merrimack and Delus x S2782.

Approximately 1,120 second-year seedlings were planted at the sub-station. The standard was particularly high and outstanding selections were made from the crosses Crana x Cherokee, Exton x Cherokee, B595-76 x Adina, S2776 x B2368-4, S2776 x Crana, and Saco x Adina.

Of 150 third-year seedlings, the most promising were Sequoia x Cortland, Crana x B2368-4, S2776 x B2368-4, 11-79 x Crana, Katahdin x Cherokee, 1928(e) 2 x Menominee, and 11-79 x B24-58. Of the fourth-year seedlings, the most promising selections were obtained from the crosses 66-10 x 11-79, Awaba x 336-123, Monak x 11-79 and Sequoia x 11-79.

Forty-five of the most promising advanced seedlings were grown in the replicated preliminary yield trial. The best seedling from this trial was a selection from S2540 x Adina. This produced a heavy yield of smooth, shallow-eyed, oval tubers with excellent cutting quality.

Breeding for Disease Resistance.—Of a number of lines tested by the Biological Branch, Division of Science Services, for resistance to late blight, ten were found to be immune to the common races. Mass seedling inoculations were carried out on 5,500 seedlings in the glasshouse at New England Experiment Farm. Resistance in these crosses was obtained from such varieties as Kennebec, Cherokee, B922-6, Delus, Merrimack, Canso, and 1563(c)14.

Two hundred seedlings were tested for resistance to common scab by planting in infected vermiculite. A few faults in technique still exist; but infection was in some cases most severe and quite a number of susceptibles could be weeded out.

Six hundred seedlings were tested for immunity to virus X. Resistance in all cases was obtained from the American varieties Saco and B595-76.

Potato Introductions.—The most promising recent introductions were Tawa and Onaway from the United States Department of Agriculture. Both produced a good sample of shallow-eyed tubers.

District Variety Trials.—Seed increase plots were grown and variety trials conducted at the Department's main testing ground at Orange.

Heavy rain during April caused an estimated loss of 50 per cent. from late blight infection and tuber rotting. Because of this loss, the quantity of seed available for district variety trials was much less than usual. Two new seedlings, S2821 and S2864, were included in seed increase plots for the first time.

In the early maturing section of the variety trial, S2846, Kennebec, S2851, and S2844 all out-yielded the standard varieties Sebago and Crana. The latter reacted to the late blight attack and gave a poor yield. In the late maturing section, S2842, S2845, S2854, S2812 and S2770 all performed well in comparison with the popular commercial varieties Sebago and Sequoia.

District potato variety trials were again conducted in twenty-three centres.

In coastal districts, where the Spring crop is grown for market as "new" grade, S2770, S2776, S2845 and S2680 showed promise. The first-mentioned, in addition to high yield, produced very attractive uniform tubers. S2812 was prolific but matured rather late for the Spring crop. Kennebec was disappointing except at Robertson, a second early district.

In tablelands districts, S2770, S2776, S2680 and S2842 performed well and generally out-yielded Sebago. The average yields of these four seedlings were approximately equal to that of Sequoia, but the tuber quality was far superior to Sequoia. The latter often produces over-large tubers of poor shape with severe hollow heart.

Potato Seed Certification.—The number of growers and the area of potatoes submitted for certification increased. There were 1,572 acres entered for certification in 1958-59 compared to 1,318 acres in the previous year. A total of 164 growers submitted crops for certification, compared to 160 in 1957-58. The area certified was 1,366 acres, compared to 1,140 acres for the previous season.

Of the crops inspected, 13 per cent. were rejected as against 14.1 per cent. in 1957-58.

Soil Fertility Demonstration Area—Guyra.—Yields of potatoes from this area once again demonstrated the difference in the fertility status of the soils under various rotations. The plot under the normal three year rotation of oats, natural pasture, and potatoes yielded approximately 3 tons per acre; whereas under wider rotations, including pasture phases, yields of up to 8½ tons per acre were obtained.

Fertiliser Trials.—A replicated fertiliser trial of factorial design was conducted at Robertson; comparing all combinations of sulphate of ammonia (none, 1 cwt., and 2 cwt. per acre), superphosphate (none, 3 cwt., 6 cwt. per acre) and sulphate of potash (none, ½ cwt., and 1 cwt. per acre).

Highest yield was obtained by the application of 6 cwt. of superphosphate and 2 cwt. of sulphate of ammonia.

Plots receiving sulphate of ammonia at the rate of 2 cwt. per acre, when combined with superphosphate at 3 cwt. per acre and 6 cwt. per acre, respectively, averaged significantly higher yields than plots receiving sulphate of ammonia alone or superphosphate alone.

Potash had no appreciable effect on the yields.

Spacing Trial.—A replicated trial in the Crookwell district compared within-row spacing of 9 in., 12 in., 15 in. and 18 in.; using the varieties Sebago and S2680.

The results demonstrated that closer within-row spacing increased the total yield, and proportion of tubers below 8 oz. It appeared that in the Crookwell district the sets 9 in. or 12 in. apart would give 15 per cent. increase in total yield over the accepted 18 in. spacing; and at the same time the proportion of tubers under 8 oz., the desirable size for certified seed, would be increased—especially in the case of Sebago.

Potato Quality Tests.—Quality testing of potatoes, in co-operation with the Division of Food Preservation and Transport, C.S.I.R.O. was continued. Twelve varieties were tested. As a group of potato varieties they were of a relatively high standard, since no sample scored less than "fair" in any quality characteristic. On the overall rating, the best quality seedlings were S2776, S2482, and S2671.

Tomatoes

Tomato Breeding.—At Hawkesbury Agricultural College breeding was continued to obtain high yielding varieties resistant to disease, and improved varieties for glasshouse growing.

At Yanco Experiment Farm, breeding was carried out to develop disease resistant varieties of good agronomic quality, suitable for processing.

In yield trials at Hawkesbury College, the hybrids Break O'Day x Rouge de Marmande, Gross Lisse x Rouge de Marmande, and Grosse Lisse x Valiant continued to give better yields than the parent varieties. Break O'Day x Rouge de Marmande has become popular with growers as a smooth skinned, first early hybrid. Grosse Lisse x Rouge de Marmande and Grosse Lisse x Valiant have given good results on the Northern Tablelands. Kokomo x Urbana and Kokomo x Rouge de Marmande, *Fusarium* wilt resistant first early hybrids and Early Pak x Daydream, a second early hybrid, were promising in trials at Hawkesbury College.

The hybrids Break O'Day x Rouge de Marmande and ES-5 x Rouge de Marmande were the most outstanding for glasshouse growing, on account of earliness and high yield. Good results were also obtained, under glasshouse conditions and in the field, with two *Fusarium* wilt resistant lines of Rouge de Marmande x *L. pimpinellifolium* A160.

At Yanco Experiment Farm, crosses were made using *Fusarium* wilt resistant parents with Tatura Dwarf Globe; to obtain wilt resistant types suitable for processing. Several lines were grown in early generations, and selections were made.

Introductions.—The most likely of the introductions tested were KY1 from the Victorian Department of Agriculture; No. 202 from the University of California; Texto 1 from the U.S.D.A.; Anahu x Manalucie, Anahu x Step 174-N11, and Anahu x Step 286, from Hawaii.

Variety Trials.—In a replicated trial of canning varieties at Yanco Experiment Farm, "No. 3, C.S.I.R.O." gave the highest yield but was inferior to Tatura Dwarf Globe in processing quality. No. 255 and Roma were of good quality for processing, but yield was inferior to the standard Tatura Dwarf Globe.

In a replicated trial at Bathurst Experiment Farm, Urbana continued to give the highest yield and retained its place as the best processing tomato in the Bathurst area. As a fresh market variety, the hybrid Valiant x Grosse Lisse significantly out-yielded the standard Grosse Lisse. Daydream, Valiant, Hybrid H and Hybrid I were of comparable quality to Grosse Lisse but not superior to it.

Beans

BEAN BREEDING

Breeding of disease resistant varieties of high yield and of a type suitable for market and processing, continued at Hawkesbury Agricultural College and Yanco Experiment Farm.

Fixed lines of Hawkesbury Wonder x Granada developed at Hawkesbury College again gave promising results, and line No. 26 was named "College Pride".

Other promising fixed lines at Hawkesbury College were No. 18 Fullgreen x Brown Beauty and No. 42 Hawkesbury Wonder x Tweed Wonder. The most promising un-fixed crossbred lines in advanced generations were Brown Beauty x Windsor Longpod and Windsor Longpod x Landreth Stringless.

In a yield test of stringless crossbred lines suitable for processing, two lines of Fullgreen x Brown Beauty and one line of Brown Beauty x Landreth out-yielded Landreth Stringless. Of the new dwarf field bean types, developed at Hawkesbury College, lines of Granada x Little Navy were most promising for yield and seed size.

INTRODUCTIONS

The most promising introductions were Pearl Green from U.S.A.; Redlands Beauty and Redlands Belle from Queensland, and Sanilac, a field bean, from Michigan.

SEED PRODUCTION

French Bean Seed Certification Scheme.—The acreage was lower, due to excessive production in the previous year; 453 acres compared to 815 acres in 1957-58. Of this total, 270 acres were certified, compared to 685 acres in 1957-58.

The acreage certified comprised Brown Beauty 152 acres, Hawkesbury Wonder 22 acres, Wellington Wonder 37 acres, Windsor Longpod 23 acres, Tweed Wonder 20 acres, Gowards Special 6 acres, Richmond Wonder 3 acres, Clarendon Wonder 2 acres and Seminole 5 acres.

VARIETY TRIALS

In a replicated trial at Terranora Demonstration Area during the winter months, Windsor Longpod gave the highest yields, closely followed by Hawkesbury Wonder and Tweed Wonder. In observational plots, Redlands Beauty was outstanding for rust resistance, yield and quality.

In a replicated trial of field beans at New England Experiment Farm, selection G57/1 returned the highest yield, followed by Small White and G57/2, Genesec and Corvette. Sanilac again showed to advantage agronomically, in comparison with Little Navy—the only commercial variety at present.

Garden Peas

Pea Breeding.—Breeding of improved varieties of peas for market and processing is a minor project, but some work was carried out at Hawkesbury College and at Yanco Experiment Farm.

At Hawkesbury College, lines of the crosses Early Dwarf x Greenfeast, Early Wonder x Canner 75, Early Dwarf x Canner 75 in the 6th generation, and Super Alaska No. 30 x Greenfeast in the 8th generation, were promising for early and concentrated high yield and good quality.

At Yanco Experiment Farm the most promising selections were secured from the crosses Greenfeast x W. F. Massey, Greenfeast x Wando, and Greenfeast x Clucas Early Dwarf.

Introductions.—Recent introductions with the best prospects were 100L and 101L, from New Zealand Loan and Mercantile Agency Company Limited.

"Time of Sowing" Trial.—In a time of sowing trial at Yanco Experiment Farm, heat units were used as a basis for determining sowing dates.

Peas sown over a period of eighty-nine days, from the 29th May to the 27th August, matured within a period of seventeen days, from the 30th October to the 16th November, and gave satisfactory yields.

Extension of this period to provide for earlier or later sowings resulted in substantially reduced yields. Thus, in the M.I.A., irrespective of sowing date there is a limited period during which peas for processing can be successfully grown and harvested.

This information is of value to the Leeton Cannery. It desires to increase production of canned peas. Seemingly, if production is to be increased, additional harvesting equipment and canning facilities will be necessary to cope with the concentrated harvest.

Cucurbits

Rockmelon Breeding.—The breeding programme was expanded at Yanco Experiment Farm to include breeding for resistance to *Fusarium* wilt and to a new strain of powdery mildew. The latter has recently shown up in the Wentworth area and the M.I.A.

In tests for disease resistance, Delicious 51, Delicious x 70133, and Spartan Rock showed good resistance to *Fusarium* wilt, and P.M.R. No. 5, P.M.R. No. 6, and Rio Sweet x 7046 were resistant to both forms of powdery mildew.

Crosses were made using P.M.R. No. 5, P.M.R. No. 6, and Spartan Rock as parents; and tested in early generations to obtain a variety resistant to *Fusarium* wilt and both forms of powdery mildew.

Rockmelon Introductions.—The most promising introductions were Spartan Rock from Michigan, U.S.A.; P.M.R. 5 and P.M.R. 6 from U.S.D.A.; and Edisto from South Carolina.

Watermelon Introductions.—Introduced varieties were tested at Yanco Experiment Farm. Calhoun Sweet, from U.S.D.A. had the best potential of the recent introductions. It produced a heavy crop of good quality melons.

Cucumber Introductions.—Of the cucumber introductions tested, the most promising were:—Smoothie, a slicing type, from U.S.D.A., and M.S.U. 231, a picking type, from Michigan, U.S.A.

Carrots

Introductions.—The most promising varieties under observation were Royal Chantenay, from Watkins and Simpson Ltd., England; Amsterdam Forcing and Autumn King, from Hurst & Sons, England.

Crucifers

Cauliflower Fertiliser Trial.—In a replicated fertiliser trial at Bathurst Experiment Farm, all combinations of sulphate of ammonia (at 0, 1½, and 3 cwt. per acre), superphosphate (at 0, 4 and 8 cwt. per acre) and muriate of potash (at 0, ½, 1 cwt. per acre) were compared.

The highest yield was from plots receiving 4 cwt. of superphosphate and 3 cwt. of sulphate of ammonia. Four cwt. per acre appeared to be the optimum rate for superphosphate. There was no response to potash; although marked potash deficiency has been recorded in the district.

Cabbage Introductions.—The variety Wisconsin Hollander, from Asgrow Seed Corporation U.S.A., was most promising; for its suitability for manufacture of Sauerkraut.

Sprouting Broccoli Introductions.—The most outstanding were 98L66 and Rumseys Sprouting, from Rumseys Seeds Pty. Ltd., Parramatta; and Morses Medium, from Ferry Morse Seed Co., U.S.A.

Breeding Brussels Sprouts.—At Bathurst Experiment Farm, crosses were made using as parents Catskill, Fill Basket, and Amager Improved. On preliminary assessments inspection the Catskill x Fill Basket crosses are promising. They are longer in the stem than Catskill; and show some resistance to *Rhizoctonia* rot.

Onions

Introductions.—Of the introductions grown for observation, the most promising was Eclipse, from Asgrow Seed Corporation, U.S.A.

Sweet Potatoes

Introductions.—In a replicated trial at Grafton Experiment Farm, the highest yielding varieties were Australian Canner, Georgia Red, and Russian 85. Georgia Red, from the U.S.D.A., produced red skinned tubers of even size, with orange flesh of good quality.

Demonstrations with Soil Blocks

A series of demonstrations with the "Quick Press" soil block-making machine were carried out in districts where early tomatoes, cucumbers and melons are produced; and at Field Days where vegetable growers and nurserymen were able to assess the possibilities of soil block culture.

Recently a firm has imported an electrically operated block-making machine. It has an output of 1,500 blocks per hour, and has produced blocks at contract rates for tomato growers in the Warriewood/Mona Vale district. Reports indicate that these soil blocks have given complete satisfaction, and that soil block culture will extend considerably next season.

Black Plastic Mulches

Effect on Vegetable Yield, Earliness, Weed Control.—The early yields of trellised tomatoes and of French beans were increased 100 per cent. by the use of black polythene mulching at Hawkesbury Agricultural College. Fruit size of early tomatoes was increased. Weed growth was controlled.

In preliminary trials at Terranora Demonstration Area, the use of black polyethylene mulch gave tomato yields more than double the yield of the un-mulched plots; and harvesting of the mulched plots commenced 16 days earlier.

In a trial with cucumbers during the Winter months, seed sown through holes in the black plastic mulch gave fair germination; whereas seed sown without mulching failed to germinate.

Results to date have indicated that black plastic mulch will enhance earliness, reduce weed growth, and may increase total yield.

Because of high cost, use of the plastic will be restricted to early districts and to vegetables which command a premium when marketed early in the season.

Pastures Section

The season throughout the State generally was satisfactory during 1958-59. Conditions were good in the north-west and on the north coast, although on the south coast it was somewhat dry until the autumn of 1959, when good rains were received. In the south-west, the autumn of 1959 was very dry and pasture growth poor.

The 1957-58 report stated that conditions were unfavourable, and that forthcoming pasture sowings would be adversely affected. Official figures now confirm that forecast.

Only 200,000 acres were sown, bringing the total area of sown pastures in New South Wales to 9,238,420 acres.

The sowings for the period ended 30th June, 1959, while not inconsiderable, were in marked contrast to the previous year—when approximately 1,250,000 acres were established.

The upward trend in fertilizer usage, primarily superphosphate, continued. Approximately twice as much fertiliser was used on pastures as on all other crops. Despite this, in 1957-58, only 4,645,000 acres were treated; little more than half the sown area.

EXTENSION

Advice, demonstrations, field days, etc., in connection with pastures, continued to occupy a major place in District Agronomists' activities.

Most of the Agricultural Extension Grant demonstrations have ended. In view of the widespread development of improved pastures these large, mainly single plot demonstrations have no great interest to farmers.

The latter are now more concerned with possible improvements through proper application of new research findings, new species, and methods beyond commonly accepted standards.

Accordingly, the demonstration and experiment activities of District Agronomists have been completely reorganised. A series of suitable demonstration and research trials known as *Uniform Pasture Survey Extension Trials* (U.P.S.E.T.), has been developed, for use throughout the State. The U.P.S.E.T.'s include the major research findings of recent years, and new promising species.

Trials have been organised such that local value of basic research findings will be demonstrated under a wide range of soil and other environmental factors, and factual data of the comparative value of the various possible treatments will be obtained.

This new approach will facilitate formulation of more precise recommendations, and will also indicate those areas and problems of plant establishment and nutrition on which additional fundamental research is required.

RESEARCH SCOPE

Pasture research was continued at the various Agricultural Colleges, Research Stations and Experiment Farms. This research covers almost every aspect of pasture establishment, nutrition, management and utilisation. A very large number of research projects is in progress.

Pasture Species Research

More suitable species are the key to more effective pasture improvement in some parts of the State, particularly the north coast and north-west; and the key to increased and more uniform production in other areas for which reasonable satisfactory species are already available.

Pasture species work has therefore been given high priority.

Considerable success has been achieved at Grafton Experiment Farm in the search for suitable summer growing legumes to complement the natural pastures. Several species are now being subjected to field trial.

They include *Phaseolus lathyroides*, *Dolichos lab lab* and *Dolichos bifloris*, *Glycine javanica*, *Desmodium uncinatum* and *Lotononis bainesii*. These have also shown promise in trials at Wollongbar.

This summer legumes project is complicated by the fact that many tropical or sub-tropical legumes have poisonous properties. This is the case with *Indigofera* and *Crotalaria* spp.

Feeding tests are in progress to determine whether non-toxic species or strains can be obtained. As a result, several strains non-toxic to the test animals (guinea pigs) have been selected, and arrangements are in hand to carry out cattle feeding tests.

Another problem associated with the summer legumes project is that there is no commercial source of seed. The possibility of producing seed either under irrigation or dryland conditions in the north-west has been investigated.

Several Buffel grass strains, also Katambora Rhodes, *Panicum coloratum*, and *Sorghum alnum* have shown considerable promise in the north-west. The Buffel grasses and *Sorghum alnum* could well become major pasture species in this area. Establishment of certification schemes will be essential to ensure purity.

In the south-west, in the better rainfall areas, the major requirements are perennial grasses, to offset the universal clover-dominance of improved pastures and use of the fertility build-up as a deterrent to invasion of pastures by vigorous growing weeds.

Several species with some promise of fulfilling those requirements are under test in grazed plots at Temora Experiment Farm. These species include *Demeter fescue*, dryland cocksfoot and smooth brome, with *Phalaris* for the comparison.

Pasture Plant Nutrition

Investigations have been continued at most Experiment Farms and in some district trials.

Molybdenum, in North Coast Conditions.—At Wollongbar Experiment Farm it has been demonstrated that the usual molybdenum dressing of 2 oz. per acre is only adequate for about three years in this area. (In other districts this rate has proved adequate for 10 or more years). No evidence of increased response to heavier dressings has been obtained at Wollongbar.

At Taree a dressing of 8 oz. molybdenum per acre appeared necessary for maximum response in lucerne.

Nitrogen Effects.—Considerable work has been done with nitrogen fertilisers.

At Wollongbar, indications have been obtained that the nutritive value of paspalum is improved by strategic applications of nitrogen.

At Berry, a "whole farm" trial to assess the economics of nitrogen fertiliser in terms of milk production failed to produce reliable data because of inadequate control of all factors in the experiment. However, it was apparent from this and other nitrogen investigations that full utilization of the additional feed produced is essential for nitrogen use on pastures to be economic.

At Hawkesbury Agricultural College, relatively small dressings of nitrogen have increased the dry matter yield and protein content of grass-legume pastures. Such dressings have also proved effective in preventing clover-dominance. Thus, they could assist in the control of bloat.

Similar trials are in progress at Leeton and New England Farms. At New England the value of nitrogen in reducing clover-dominance has been noted.

At Berry, it has been demonstrated that satisfactory crops of maize can be produced by sod-seeding into pasture, together with nitrogen fertilizer. Thus a maize crop can be produced without making the pasture unavailable for winter and spring feed. Similarly, oats can be sod-seeded into pasture in the autumn to increase the winter and early spring production from the pasture.

Pasture Establishment Research

District research plots at Wyong revealed that drill placement of seed and fertiliser in close proximity greatly increased the early feed production from the pasture (2 cwt. superphosphate drilled with the seed was equal to 4 cwt. broadcast, in terms of yield). Later production was not materially affected. Similar results were obtained at Berry.

This is of considerable significance in dairying districts where most pastures are broadcast-sown and yet early production is of great importance.

At Condobolin Experiment Farm, a long term trial on lucerne establishment was completed. A report has been prepared for publication.

In areas where large acreages are sown and climatic conditions make establishment hazardous, costs have to be kept to a minimum. The trial recently completed at Condobolin indicates that lucerne can be satisfactorily established with a cover crop in most years provided the seeding rate of the wheat cover crop is reduced to 30 lb. per acre.

Under the more adverse conditions at Yanco, it has been shown that a subterranean clover-Wimmera ryegrass pasture can be satisfactorily established in most seasons under a cover crop, using a reduced seeding rate for the latter.

Pasture Maintenance and Management Research

At Yanco, under dryland conditions, perennial grasses, including *Phalaris*, have failed to persist when sown in association with lucerne. Further work was commenced using perennial grass species in association with annual legumes.

At New England Experiment Farm, a comprehensive fertiliser trial, incorporating superphosphate, potash, nitrogen and animal manure, is now in its twelfth year. The swards reflect the fertility status of the soils under each fertiliser treatment and confirm the importance of adequate fertiliser dressings in maintaining production and a satisfactory pasture composition.

Superphosphate at 2 cwt. per acre, with some assistance from the nitrogen and sulphur components of sulphate of ammonia, has proved most satisfactory in maintaining production and pasture balance, but lime and potash treatments have been ineffective. Animal manure has been in the treatment of all of the highest yielding plots. Although not a practical treatment, the result has emphasised the importance of the grazing animal in pasture maintenance.

Importance of sulphur was again demonstrated in trials on virgin basalt soils in the Glen Innes district, but on this soil type, gypsum cannot replace superphosphate as a maintenance fertiliser, even after high initial dressings of the latter.

A trial has been commenced at Trangie to determine the effect of various grazing techniques on Buffel grass.

At Hawkesbury Agricultural College there are "miniature" trials incorporating two levels of defoliation and three levels of nitrogen fertilisation. They suggest that even under heavy fertilisation, and where moisture is not limiting, close defoliation greatly reduces the production of a pasture. It is believed that too close grazing is a major factor in the short life of many coastal pastures.

Australian Agrostology Conference

The Australian Agrostology Conference was held at the University of New England, Armidale. A number of Division of Plant Industry officers engaged in pasture research attended. Most of them presented papers to the Conference.

Pasture Seed Certification

The amount of pasture seed produced under the Departmental certification schemes was somewhat greater than in the previous year. Subterranean clover constituted the bulk of certified seed; about 1,130 tons were produced.

Production of certified *Phalaris tuberosa* seed was the greatest for a number of years. About 36 tons of seed was sealed; and it was expected that the total yield would amount to 60 to 65 tons when cleaning operations were complete. This quantity can readily be absorbed on the local market; for many years considerable quantities have been imported from the U.S.A.

A small quantity of white clover seed was also produced.

Seed Testing Laboratory

The number of samples received for testing was somewhat below that of recent years.

The reduced work was offset by the large turn-over in staff. Seven resignations occurred. As all new appointees have to undergo a training period, seven resignations within a year in a total staff of fourteen greatly reduces the efficiency of the unit.

Agricultural Seeds Act—Regulatory Activities

The normal regulatory activities were continued, although the number of inspections was reduced because of a staff vacancy of some six months duration.

No prosecution was instituted under the Seeds Act, but warnings were issued.

The general standard of seed offered by seed vendors was high, but some country retailers handling locally produced seed offered seed below the legal standards.

Weeds Section

GENERAL

Co-operation with Local Governments.—Close collaboration in weed control activities has been maintained, by District and Specialist officers, with many Councils. Many councils, particularly the County Councils, have continued to achieve excellent results. Some Councils are still not carrying out their responsibilities satisfactorily.

Funds from Department of Local Government to Councils.—The financial assistance for noxious plant control was increased by £10,000 to £35,000. On a recommendation from this Division of Plant Industry approved by the Minister for Agriculture, the grant was distributed as follows:

	£
9 County Councils (comprising 35 Shires and 12 Municipalities)	20,750
46 Shires	12,500
10 Municipalities	1,750

Provision of increased funds has been followed by increased activities by Shires in noxious plant control measures. The results being achieved by the majority of Weeds County Councils are most encouraging.

Weeds Revision Group Conferences.—These were held for two groups of Shires and Municipalities; at Leeton and Denilquin respectively.

Other changes in noxious weed declarations have taken place; independent of Group Conferences. In particular, Long Styled Feather Grass has been declared noxious in many areas.

Recommendations have also been made in many parts of the Western Division for the declaration of noxious weeds.

EXTENSION AND RELATED FIELDS

Special Weeds School.—A special school for Council Weeds Officers, Pasture Protection Board Officers, technical representatives and manufacturers and others concerned with the dissemination of weed control advice to farmers, was held at Tamworth in association with Department of Agriculture personnel in the Northern and North-western Agricultural Regions. The school was most successful and represents a major step forward in weeds advisory services.

Special Field Days.—Seven special field days dealing with weeds were held; in the Northern Agricultural Region, and the Central tablelands.

One, held at Rockley, was arranged specifically for the benefit of Shire Councillors and Council staff.

Weeds were also featured at a number of field days in various parts of the State where other subjects were also included.

Weeds Displays.—A special display of noxious weeds was staged at the Royal Agricultural Show, Sydney; and also at at least six country Agricultural Shows.

Weeds Sessions at Conferences.—The Special Agronomist (Weeds) contributed in the form of papers or discussion material at the Australian Agrostology Conference, the Aerial Agriculture School, at Hawkesbury College, and the Australian Seeds Conference.

Strong Demand for Specialised Weeds Advisory Services.—From Agronomists, Councils (especially Counties), farmers organisations, other Government Departments, manufacturers, and others, there was continued strong demand for specialist weeds advice.

The estimated value of herbicides used in the Commonwealth for the year exceeded £2,000,000. This is an indicator of greater interest in weed control; necessitating increased research and advisory work.

Close liaison has been maintained with manufacturers in respect of advice on technical matters and herbicide marketing.

SERRATED TUSsock (*Nassella trichotoma*)

Increasing Infestations.—This weed continued to be one of the major problems of the central and southern tablelands. It is still spreading in both areas.

Infestations are spreading and thickening up on unimproved country in the central and the southern tablelands; while several previously unknown small infestations have been found on the northern tablelands.

Thickening of infested areas is mainly attributed to the effect of the dry season in 1957 and early 1958. This reduced the ground cover. Germinating tussock seedlings thus had less competition.



"Boom Spraying by Helicopter"

At some of this year's field days the definite place of helicopters for spraying in conditions not suiting fixed-wing aircraft nor ground units was demonstrated.

The helicopter has value for weed control in rugged country, for control of brush generally where a higher volume of spray than can be applied with a fixed-wing aircraft is needed, and for control of weeds along water courses and in swampy areas.

It may also have a place in control of insects and diseases in crops such as sugar cane (this picture) and bananas.

It is being considered also for aerial sowing of rice, and for broadcasting sulphate of ammonia in rice farming.

(Photo—Murwillumbah Office)

Publicity Taking Effect.—Publicity in recent years has brought about a wide knowledge of the weed and its control measures, particularly in central districts.

Large-scale Control Programme, from the Air.—On the central tablelands about 3,000 acres of infested country have been topdressed and seeded from the air. This is the first step in a large-scale control programme there. It reflects close collaboration between the Department and the Upper Macquarie County Council and farmers, and confidence in the research being carried out.

In southern districts, however, there is a less wide acceptance of the essentiality of pasture improvement and pasture management in the control of serrated tussock.

Research Outcome.—Research has brought out the following important points so far as control measures are concerned:—

- (i) Competition by more vigorous plants, even with little grazing, and careful management, will take some time to smother serrated tussock.
- (ii) Herbicides plus growth of good pasture species can control this weed. The disadvantages include high cost per acre for the treatment; some dependence on weather conditions; and, as with all forms of control of serrated tussock, permanency of effectiveness is dependent on grazing severity and seasonal conditions after the first eradication step.
- (iii) Ploughing of arable areas is best done with a mouldboard plough, or, secondly, a disc plough, and, lastly, a chisel plough.
- (iv) Ploughing of semi-arable areas with a chisel plough should encompass three or four workings and a summer fallow.
- (v) Ploughing, and sowing of improved pasture wherever possible is by far the best method of eradication. Quite steep areas can be ploughed with crawler tractors and chisel ploughs. This method will become the major weapon in the attack on serrated tussock.
- (vi) Careful management of the pastures once established has been shown to be vital to successful control.
- (vii) Wenigup strain of subterranean clover has been a most promising pasture species tested. This is because of its vigorous early growth and late maturity.
- (viii) "Time of sowing" tests of pasture species on unprepared seedbeds has shown that late seeding, in June or July, is important for best establishment.

Re-infestation Circumstances.—There are serrated tussock demonstration control areas some four years old in all districts, with no reinfestation. These have illustrated the value of proper land preparation and proper management of the sown pasture. In many other cases only light reinfestation has occurred and this has been brought under control by hoeing.

There are other areas where, following initial success, reinfestation has occurred—due to faults in land preparation and subsequent management of the improvements. Faulty land preparation, and subsequent overgrazing, have resulted in moderate to heavy reinfestations.

Surface seeding of pastures to control tussock has had limited success because of stock management problems.

SKELETON WEED (*Chondrilla juncea*)

Spreading.—This serious pest in areas under crops continued to spread; towards the north, and further into the south-west. In these areas of spread, efforts have been made to eradicate infestations in their incipient stages.

Fallow Spraying—Varied Results.—In the more heavily infested areas, there has been much interest in fallow spraying as a method of control; but results have been erratic, due to seasonal conditions, competition by Wimmera rye grass, and other factors as yet unresolved.

BATHURST AND NOOGOORA BURRS

Bathurst burr (*Xanthium spinosum*) and Noogoora burr (*Xanthium chinense*) were more widespread than usual during the past summer, owing to widespread late summer rains. Efforts have been made to halt the spread of Noogoora burr towards south-western districts.

WEEDS OF MIXED ANNUAL PASTURE

Invasion of subterranean clover-based pastures by annual weeds such as thistles, Paterson's Curse, barley grass and other unwanted, remained one of the most serious problems of pasture improvement in the southern half of the State. The problem appeared to be worse than in previous years.

Increased prevalence of these weeds was attributed to the increasing build-up in soil nitrogen. The most severe infestations occurred on old-established, clover-dominant swards.

On arable land, cropping had to be reintroduced to the rotation for satisfactory control; introduction of perennial grasses such as *Phalaris*, has proved excellent control.

On non-arable areas, the problem is much more acute; and many landholders adopted spraying to control thistles and broadleaved weeds.

WEED CONTROL IN LUCERNE

In recent years, trials of 2,4-DB have been conducted in co-operation with herbicide manufacturers, for control of weeds in seedling lucerne and newly-sown irrigated pastures.

Success in these trials has been followed by the spraying of an estimated 3,000 acres; mainly on the central coast and in Hunter River districts, but also in other lucerne growing areas. A wide range of annual weeds, and also skeleton weed, have been controlled satisfactorily; with a marked improvement in establishment of the lucerne or pasture.

CONTROL OF BARNYARD GRASS IN RICE

Further investigations were conducted at Yanco Experiment Farm in the use of herbicides for the control of barnyard grasses (*Echinochloa* spp.) in rice.

TCA and CDAA, each at 6 lb. per acre, gave good control of barnyard grass when applied before the emergence of the rice. Post-emergence sprayings were less effective.

Control with CDAA was slightly better than with TCA. However, on grounds of cost, the latter would be preferable.

WEED CONTROL IN VEGETABLES

Extensive trials were conducted in coastal districts for chemical control of weeds in vegetables.

In Onions.—CDAA was the outstanding chemical for pre-emergence weed control at rates of from 3-4 lb. per acre. CIPC was also effective but only gave useful weed control on main season and late crops.

For post-emergence weed control in crops which had already received pre-emergence treatment, CIPC at 4-6 lb. per acre and MCPB at $\frac{1}{2}$ lb. per acre gave effective control of grasses and broadleaved weeds respectively. Monuron at $\frac{1}{2}$ lb. per acre was promising.

In Beetroot.—Good weed control was obtained with TCA, CDEC and EPTC prior to crop emergence. Endothal—TCA mixtures also gave encouraging results.

In Peas.—DNBP at 2 lb. per acre, post-emergence, gave excellent control of wild radish and fumitory in the Port Macquarie district. Pre-emergence trials were also being undertaken.

In Cucumbers.—Outstanding control was achieved by the use of CDEC at 6 lb. per acre with marked yield increases. Amitrol was also effective.

Other Trials in Vegetables.—Further trials have been carried out or are in progress for control of weeds in cabbages, silver beet, parsnips, carrots, and lettuce.

WEED CONTROL IN OTHER GARDEN CROPS

In Strawberries.—Trials at Gosford Citrus Experiment Station for control of weeds in strawberries have shown Neburon to be outstanding, for both winter and spring weed control—with no damage to the crop. The only other herbicide which did not damage the crop was DNBP, applied before planting.

In Gladioli.—A pre-emergence herbicide trial showed that the best treatments were CDAA, CDAA + 2,4-D, and TCA + 2,4-D. It was also found, however, that 2,4-D occasionally caused floral deformities and stalk twist; the extent depending on the variety.

BROOMRAPE ON SUBTERRANEAN CLOVER

Broomrape (*Orobancha* sp.), a parasite on subterranean clover as well as other clovers and weeds, has spread rapidly in the subterranean clover seed-production areas. It now constitutes a major problem.

Of a total of 25,000 acres of subterranean clover submitted for seed certification, 700 acres were rejected on account of this weed. In the previous year only 100 acres of a total of 15,000 acres were rejected.

Satisfactory measures to give complete control in seed-producing areas have not yet been worked out.

GROUNDSEL BUSH

Groundsel Bush (*Baccharis halimifolia*) continues to spread rapidly in the higher rainfall areas of the north coast. Richmond River County Council is undertaking large-scale spraying to bring it under control.

CO-OPERATION OF HERBICIDE MANUFACTURERS

Close liaison has been maintained with herbicide manufacturers in the interchange of information, the supply of materials for research purposes, and the laying down of co-operative experiments in various parts of the State. Local overseas firms are concerned. The co-operation has been of mutual benefit.

Irrigation

Trends.—Increase in farmers undertaking spray irrigation systems was less marked than in 1957-58, because of the mild summer and, in general, the above-average rainfall. Spray plants purchased in former seasons continued to be used, but less so than previously. The great increase in flood irrigation projects, by pumping from inland rivers, continued.

Basic reason for the difference in rates of increase of these two systems of irrigation is that the bulk of spray irrigation occurs in the coastal and tablelands regions. These enjoyed relatively good rainfall. Flood irrigation almost wholly occurs in drier inland regions.

Co-operation with Water Conservation and Irrigation Commission.—Co-operation was close in various spheres of mutual interest; the Special Agronomist (Irrigation) being a member of the various Boards and Committees.

Hunter Valley Conservation Trust.—This Trust held ten meetings and carried out two inspections of works. The Trust derives income from rating, and dispenses it by contributions to approved works in the Hunter Valley. These include flood mitigation river-works, river improvement and re-alignment, soil conservation works, and re-afforestation on private lands. Contributions made to private landholders, shire and municipal councils, and Government departments carrying out approved works, are in each case authorised by the Minister for Conservation.

Water Act, 1912-1955—Board of Inquiry Activities.—This Board held four meetings, apart from public inquiries; to discuss matters referred to it by the Water Conservation and Irrigation Commission.

The Board held a public inquiry at Finley in July, 1958, into the Berriquin Surface Drainage Proposal. It took evidence from the Water Conservation and Irrigation Commission and from objectors to the proposal. Subsequently, a report was submitted to the Water Conservation and Irrigation Commission, in accordance with the provisions of the Act.

A further public inquiry (five days) was held, in Sydney and at Bourke in November and December, 1958, into a case concerned with the Colonial Sugar Refining Company's application for a licence for a bore at Bourke, objected to by landholders. The case is proceeding.

Three other cases were submitted to the Board. Two were withdrawn by the objectors, after preliminary meetings of the Board but prior to the public inquiries. The other case was dealt with and reported upon.

Sub-Committee on Standards for Spray Equipment.—In association with the Australian Standards Association a drafting sub-committee, including the Irrigation Specialist, was constituted in September, 1958, to make recommendations in regard to standards for spray irrigation plants and spray heads. This sub-committee has met seven times. Progress in formulating test procedures for spray head performance has been considerable.

Blowering Dam Investigation Committee.—This inter-departmental committee, to investigate and report to the Government on irrigation development in the Murrumbidgee Valley as a result of the Snowy River diversion, continued its work. A special sub-committee carried out investigations in N.S.W. and Victoria. It reported on farm size, water allocation to farms, and some aspects of rural finance for farm development. Five meetings of both the full committee and the sub-committee were held, and two fact-finding inspection tours were made.

Committee re Allocation of Water to Irrigation Districts.—A committee was appointed to make recommendations to the Water Conservation and Irrigation Commission in this matter, with particular reference to the Murray River, covering present and proposed irrigation schemes. The work is proceeding.

Other Committees.—The Special Agronomist (Irrigation) has also functioned in other committees, including those concerned with Advice on Flood Mitigation, the Menindee Lakes Irrigation Proposal, and War Service Land Settlement investigations into the position of some settlers on irrigation farms. Several meetings were held in connection with these matters.

Assistance under the Farm Water Supplies Act, 1946.—Applications under this Act for loans exceeding £1,000 are by arrangement referred to the Department of Agriculture by the Water Conservation and Irrigation Commission for investigation and report on agronomic and economic aspects of the proposals. This year, seventy-eight applications were reported upon, either by District Agronomists or Fruit Officers, and consequent recommendations were forwarded to the Water Conservation and Irrigation Commission.

Many other applications, not involving loans, or for a lesser amount than £1,000 were discussed with designing officers of the Water Conservation and Irrigation Commission and were subject of recommendations.

Irrigation Short-term Schools.—Two short-term, in-service schools on irrigation were conducted for Departmental district officers who have not been stationed in irrigation areas. One school was for District Agronomists and Fruit Officers. The other was for Livestock Officers and Dairy Officers. They were conducted at Yanco Experiment Farm.

A most successful irrigation school was organised in the north-west by the Namoi Divisional Council of the Agricultural Bureau, in association with the Department.

At these schools most of the lectures and demonstrations were given by Departmental officers, with valued assistance by officers of the Water Conservation and Irrigation Commission.

Agricultural Extension Grant and Dairy Grant Demonstrations.—The various projects and demonstrations were continued. A new demonstration under the D.I.E. Grant was instituted, viz., Bentonite lining of a dam in pervious soil to overcome seepage. This has been a success.

Field Days, etc.—Field days and Agricultural Bureau conventions were attended by the Special Agronomist (Irrigation) to lecture on irrigation topics.

Advice has also been given to farmers by letter, telephone and personal contact, on matters relating to irrigation and land drainage.

Irrigation Research.—A programme of research into spray irrigation has been commenced at Yanco Experiment Farm.

Work there on spray irrigation of stone fruit trees is concerned with evenness of watering and the effect of trees on water distribution patterns.

Water use in vegetable crops is also being studied.

DIVISION OF HORTICULTURE

Regulatory Services

PLANT QUARANTINE

Importance of overseas plants and plant products were examined for the Commonwealth Department of Health in accordance with the Quarantine Act.

Seed.—The quantity of grass and clover seed imported this year amounted to 10,057 sacks as against 24,000 last year. Most came from New Zealand. Some consignments contained prohibited weed and/or cereal seed and were cleansed before release to importers. Some lines, showing insect infestation, were fumigated.

The quantity of flower and vegetable seed imported was approximately the same as in the previous year. Most came from the U.S.A., Holland, New Zealand, United Kingdom and France. Some consignments contained weed seeds or were infested with insects, and in each case appropriate treatment was directed before release.

Nursery Stock.—Importations were considerably less than in the previous year, and comprised 4,212 orchid plants, 17,021 bulbs, 8,162 ornamental plants and 1,371 rose-bud eyes. The majority came from the U.S.A., Holland and Hawaii. In some consignments of plants, scale and other insects were found, and in bulbs mite infestation was rather prevalent. Appropriate treatment was carried out in all instances before the plants and bulbs were permitted to go out to registered quarantine nurseries for growing under post-entry examination.

Passengers' Baggage.—Inspection of passengers' baggage was carried out during Customs examination of passenger and migrant ships. Service was made available on 133 vessels. Considerable quantities of prohibited and infested goods were detained for destruction or treatment.

Parcels Post.—Daily inspections were carried out at the Parcels Post Office, of parcels and packages from overseas containing plants or any form of planting material as well as those containing goods or merchandise of possible quarantinable nature. In all, 10,165 parcels were examined, as against 10,473 for the previous year; and the number detained for further instructions, treatment, or destruction was 2,587, as against 2,579 last year.

The detained parcels contained largely seeds, plants, bulbs, raw cotton samples, basketware, popcorn, maize, rice and peanuts.

Timber.—Importation of timber, both sawn and in log form, amounted to about 172 million super feet; some 2 million super feet less than last year's importations. The main timber import was Oregon from North America, comprising 82 million super feet; about 13 million super feet less than last year. This was offset by increased pine from New Zealand, and maple logs and sawn timber from Borneo, Indonesia, Malaya and New Guinea.

Borer infestation was found in three small parcels of sawn timber, amounting to 60,000 super feet, and in some logs from Africa, France and the United Kingdom. All infested timber was treated under supervision before release.

Sirex Wasp.—Inspection was maintained on all overseas wharves, in the examination of cases and wooden crates containing general merchandise, for detection of *Sirex Wasp* and other wood-boring insects. The quantity quarantined was less than last year; due to smaller cargoes, and greater care in selection of borer-free timber for use in cases and crates.

Inspection of Goods Shipments.—During the year, 749 different shipments of cargo arrived at the port of Sydney, and a wide range of plant material requiring inspection was discharged. Some of the main imports were copra, spices, peanuts, canning beans, nuts, cocoa and coffee beans, bamboo-ware and cotton piece goods. Considerable quantities of some of these goods were subject to fumigation, heat treatments, recleaning, or crushing, as the case required; all carried out under supervision.

EXPORT INSPECTIONS

Exports of fresh fruits, flour and rice were inspected under the provisions of the Commerce (Trade Descriptions) Act. The export of fresh fruit was an all-time low.

Citrus Fruits.—A total of 2,779 bushel cases of very good quality Navel oranges was exported, of which 2,060 cases went to Aden, 300 to Singapore and 419 to Fiji. Only a very small quantity of Valencia oranges was exported, due to severe frosts in inland areas. In all, 1,250 cases of Valencias were shipped; 500 cases to Singapore and 750 cases to Hong Kong. The only lemons exported were 1,088 cases, from the Gosford district, to Hamburg.

Apples.—A total of 35,992 bushel cases was shipped to the United Kingdom; comprising 11,797 cases of Granny Smiths from Queensland, and 23,752 cases of Granny Smith and 443 cases of Cleopatra from New South Wales. Shipside rejections totalled 1,954 cases, on account of spray residue, sunscald, and hail-mark.

Despite the light crop in some districts, it would have been possible to ship a much larger quantity had the market been favourable in the United Kingdom.

Pears.—The only pears shipped this season were 950 cases of Packhams Triumph to Singapore.

Grapes.—The Singapore shipments comprised 672 cases of Ohanez grapes of excellent quality. A relaxation of the Export Regulations this season permitted the Waltham Cross variety to be exported to Fiji in half-bushel cases without cork packing and without refrigeration. The out-turn under these conditions was not satisfactory, except in the Ohanez variety.

Rice.—The export of rice remained at a high level. Main destinations were the United Kingdom, New Zealand and the Pacific Islands.

Flour.—The normal export of flour did not commence until October, 1958, but from then until the end of May, 1959, 69,807 short tons were exported. The main destinations were Malaya, Borneo and the Pacific Islands. No beetle infestation was found at shipside inspection.

CITY MARKETS AND INTERSTATE SUPPLY INSPECTIONS

Apples.—The quality of apples at the end of the 1958 season was poor, especially Tasmanian Croftons and Democrats, due to stem-end rot. Granny Smiths from New South Wales held fairly well, although some were showing signs of breakdown. Victorian apples generally were lacking in colour, small, excessively russeted and of poor quality. South Australian fruit was mostly small and in light supply, but the presentation and grading were excellent.

Tasmanian shipments were light. Democrats were shipped until February and many consignments were wasty due to stem-end rot, and had to be repacked before sale. A number of shipments from Hobart showed eggs of the European Red Mite, and all these lines were fumigated.

Many consignments of locally grown new season's apples were fruit fly infested; resulting in heavy condemnations.

In February, Queensland commenced forwarding Jonathan, Delicious and Granny Smith varieties.

In March, all main districts in this State were marketing all varieties. They were of very good quality.

Pears.—Most of the pears marketed in the City Markets during the second half of 1958 were from Victoria, and of rather poor quality. The first of the new season early varieties were marketed from Lakesland, N.S.W., and Victoria; followed by mid-season and late varieties from the Orange and Batlow districts of N.S.W. and Victoria. Almost all of the Victorian fruit was over-graded; and most of the consignments, especially from packing sheds, were accordingly marked down to "Good" grade and some to "Domestic" grade, due mainly to hail-mark, severe russet, and malformation.

Citrus Fruits.—The N.S.W. main crop of Navel oranges was moderately light but the quality was good. South Australia forwarded rather heavy supplies of excellent quality fruit each week.

Large consignments of second crop Navels were marketed from N.S.W. coastal districts. The majority of these consignments were tested for juice content. Those not complying with the required standard for the retail trade were permitted to be disposed of to approved factories for manufacturing purposes. Marketing of the new season Navel crop from early coastal districts commenced in mid-April, and testing for maturity has been carried out regularly. Very few consignments have failed to meet the required standard.

Only a small percentage of the Valencia crop was marketed from the Murrumbidgee Irrigation Areas, due to severe frost damage affecting the juice content. Even then many of the consignments did not meet the required juice standard, and their sale to the retail trade was not permitted. Second crop Valencias from coastal and Hills districts were in heavy supply, but generally the quality was very poor. Most of the fruit was artificially coloured, and did not keep well.

A good supply of choice quality grapefruit came forward from South Australia.

Apricots.—Large quantities of early apricots were marketed from the Kurrajong district, but fruit fly infestation caused many condemnations. The Trevatt variety from the Murrumbidgee Irrigation Areas, Murray Valley, and Victoria, were of good size and quality.

Peaches.—Peaches were in light supply, and fruit fly was prevalent in many lots. Fruit from the Bathurst district was of high quality. Brown rot disease caused heavy losses in consignments from the Murrumbidgee Irrigation Areas.

Cherries.—Light supplies of cherries came forward from all districts, and Brown rot caused heavy losses.

Strawberries.—Queensland berries were in plentiful supply and the quality was good.

Potatoes.—Consignments totalled 1,358,202 sacks from local and interstate sources; 12,886 sacks more than last year.

New South Wales-grown potatoes amounted to 179,900 sacks. They were not as high a standard as those from interstate; 2,500 bags were withheld from sale, to be picked over for potato moth, eelworm, wet rot, and mechanical injury.

Tasmania was the largest supplier, with 810,065 sacks. No major fault was found with these shipments, and no outbreak of disease was present in any consignments.

Victoria supplied 254,300 bags, Western Australia 69,437, Queensland 42,600 and South Australia 1,900. Some 600 bags from Victoria were picked over for potato moth and wet rot, but generally the Victorian consignments were satisfactory. Quality and condition of the potatoes from Western Australia, Queensland and South Australia were generally good.

DISTRICT AND SUBURBAN INSPECTIONS

Fruit Fly.—This past season fruit fly was of major importance in New South Wales, the worst for many years.

Outbreaks occurred in the Murrumbidgee Irrigation Areas and Murray River districts, resulting in the loss of the New Zealand citrus export market as far as this State is concerned.

In the M.I.A., fruit fly was detected at Leeton, Yanco, Griffith, and Yenda, and on the Murray River at Dareton, Corowa, and Albury.

The outbreaks on the Murray River required the appointment of additional staff to give 100 per cent. inspection of citrus fruits, a requirement demanded by Victoria prior to admission of fruits from centres where fruit fly had been detected.

Following representations to this Department by Murray River growers and Victoria, a daylight road block was maintained at Euston on a fifty-fifty cost basis with Victoria, for a period of approximately four months.

To provide necessary shelter for officers operating the Euston road block, this Department has arranged for a permanent shelter shed to be erected. In co-operation with Victoria, the road block for inspection of all fruits being carried to the Lower Murray through Euston during the period October to June, inclusive, will be re-established each year.

Quarantine action to stop fruit fly being taken into the M.I.A. continues to be a major problem. Spasmodic checks on the roads leading into this Area were carried out. Under the Irrigation Act it is an offence to convey fruits into the M.I.A. without permission of the Water Conservation and Irrigation Commission. During the year 10 persons were detected. All were prosecuted.

The first recorded outbreak of fly in Lord Howe Island occurred. Efforts were made in co-operation with the Chief Entomologist to eradicate the pest, but were not successful. (There is further reference to this outbreak, and the efforts undertaken, in this Report under "Entomological Branch".)

Officers of this Division of Horticulture, and Division of Science Services, have extended full co-operation to the C.S.I.R.O. Division of Entomology, Canberra, in the liberation of new fruit fly parasites introduced from Hawaii into New South Wales.

Citrus Gall Wasp.—It has been impossible to prevent the spread of this pest through Sydney suburban backyards, and it is doubtful if any suburbs are free of infestation. Anti-citrus gall infestation campaigning is now confined to inspection of nurseries and the perimeter of commercial fruit growing districts. To date the pest has not been detected in any commercial orchards, although quite a few infested trees have been found in nurseries. (There is further reference to this pest under "Entomological Branch".)

Potato Inspection.—Inspection of potatoes on behalf of Certified Seed Potatoes Co-operative (N.S.W.) Ltd. continued, as did general inspection of table potatoes as required under the Plant Diseases Act.

Implementation of the Potato Growers Licensing Act is carried out by Departmental Inspectors. Due to various factors this Act has been difficult to enforce satisfactorily, but a method of "blitz" inspection has been introduced with success. It requires inspectors at appropriate periods to concentrate for two to three weeks on detections in particular districts.

Banana Bunchy Top Control Scheme.—With a full staff of Inspectors, and rearrangement of district boundaries on the Richmond, work of the Bunchy Top Control Scheme proceeded smoothly and efficiently. Inspectional work of the patrols has been speeded up and increased acreage has been inspected. A conference of Inspectors and Foremen of Patrols was held at Mullumbimby, at which opportunity was taken to standardise procedure in all aspects of the scheme. Practical demonstrations of inspectional and treatment methods were also conducted in the field.

A general reduction of Bunchy Top was recorded in all districts, and 2,692 infected plants were found, as against 3,925 during 1957-58. A major contributory to the further decrease of the disease would appear to be the influence of the Williams variety. This is less susceptible than Cavendish.

Prosecutions and Warnings under Various Acts.—Seventy-five prosecutions were carried out by Departmental inspectors, and 228 letters of warning were issued to growers, for various offences under the Plant Disease Act, Irrigation Act and Potato Licensing Act.

Due to frosts, a high percentage of citrus fruits, especially from the Murrumbidgee Irrigation Areas, were "dry". They contained less than the prescribed 33 per cent. of juice. To prevent this fruit reaching the markets, staff were made available to test fruit in orchards and packing sheds.

Generally, growers and shed managers were appreciative of the service given. This prevented considerable quantities of citrus fruits being marketed at a great loss to the growers through subsequent condemnation by market inspectors in Sydney.

Further assistance was given growers and packing sheds at the point of production, by advice on maturity standards. At Gosford, this work required the full-time services of one inspector for a period of two months. The shed managers at Gosford co-operated by refusing to place in the colouring rooms any citrus fruits unless these had been inspected and were at the stage of maturity required by the regulations.

Extension Activities in Horticultural Industries

Specialists and District Fruit Officers carried out a heavy programme of extension activities, in relation to all phases of fruit production. Demand for their services is constant and steadily increasing, and good use has been made of a wide range of extension media—mass, group, and individual. Country press and radio, and the farm organisations, have been very co-operative in promotion of extension opportunities. Officers have fully availed themselves.

Some notes of possible special interest are as follow:—

Apple Black Spot Warning Service.—This Service, at Orange and Batlow, was based on the Hirst Spore Traps and use of the radio network. It was largely responsible for excellent results in control of Black Spot of apples and pears in both areas. At Batlow, in particular, seasonal conditions were very favourable to heavy Black Spot infection, but losses were negligible.

Underground Drainage.—This received special attention from field officers in the Lower Murray areas and coastal districts, particularly in relation to citrus growing. Fruit Officers act on the Tile Drainage Committee of the M.I.A., and this Committee directs a tile drainage programme that is progressing very satisfactorily.

Methods of Irrigation.—These also received special attention from district Fruit Officers. They also assisted growers to obtain tests of irrigation water for salt.

Fruit Fly Control.—Received special attention. There is more detail elsewhere in this report of the Division of Horticulture, and the Entomological Branch of Division of Science Services.

Vine Pruning Campaign.—A vine pruning film, produced by the C.S.I.R.O. in association with the New South Wales and Victorian Departments of Agriculture, was purchased for extension use.

In the M.I.A. a special pruning campaign was conducted; comprising two separate field days, each followed by an evening session at which the vine pruning film was shown. The film screening was supplemented by slides illustrating various techniques of vine pruning.

Campaign Against Marketing Immature Table Grapes.—A special campaign was conducted in the Counties of Cumberland and Camden, to stop the practice of marketing immature table grapes. Growers were made aware of the maturity requirements, as well as cultural practices to assist adequate ripening. The campaign results were very satisfactory.

Campaign Against Marketing Immature Citrus.—Special efforts by district and markets staff were also directed against marketing immature citrus; the results were singularly successful.

Soldier Settlements.—Fruit officers were members of Advisory Committees functioning in respect of Soldier Settlements at Coomealla and Ellerslie in the Lower Murray-Darling Area. Some of the first plantings on the Coomealla settlement are in production, but Ellerslie has not developed as rapidly as expected.

Field Days were held at Coomealla, Merbein and Woorinen to demonstrate pruning and care of young vines. Officers in this area were frequently called upon for advice on land-use, land grading, farm design, spray irrigation and drainage in the new settlements being developed in Lower Murray districts.

Demonstration plots of apricots, prunes, plums and peaches are being developed to assist intending growers in the Mid-Murray area—with advice on methods of growing and handling these fruits.

Citrus Bud Selection Society of N.S.W.—Assistance was again given to this Society. It functions to help assure supply of reliable budwood to nurserymen; by inspecting trees nominated under the Parent Tree Registration Scheme. The Society supplied more buds than in the past two years. Demand was mainly for buds to work on to trifoliata rootstock.

Orchard Soil Improvement: Young District.—In the Young district the value of clover for improving orchard soils has been well demonstrated.

Now considerable interest is shown in the work being carried out on use of fertilisers. Numerous field days in this district attracted large attendances.

Optimum Stage for Prune Harvesting.—Emphasis was placed on the need for harvesting prunes at the optimum stage. Much use was made of the refractometer to demonstrate this.

School on "Tropical Fruit Culture and Small Crops".—This was held on the Tweed for senior Junior Farmers. It was a co-operative project with the Junior Farmer Movement and the Banana Growers' Federation. Departmental, local officers provided the instruction. Twenty-three students attended, representative of all banana districts on the north coast. The success of the school was such that it seems likely to become an annual fixture.

"Banana Bulletin" of the Banana Growers Federation.—A special page has been allotted to the Department for items of technical and topical interest to the industry in the Federation's "Banana Bulletin". The page has been well received by growers. It enables a prompt finding of officers' statements, convenient for filing by growers.

Fruit Officers have attended and addressed branch meetings and all District Council meetings of the Banana Growers Federation; promoted four major Field Days and many local group demonstrations/discussions.

Meanwhile, Duranbah Demonstration Plot again attracted several organised visits by tropical fruit growers. The one acre production and cost figures from the Plot continue to provide practical data and basis for assessments in the banana industry.

Research for the Horticulture Industries

SUMMARY

(1) Considerable progress is reported in the establishment stages of the Tropical Fruit Research Station, Alstonville.

(2) Low volume misting for the control of *Cercospora* leaf spot of bananas was used for the first time as a commercial control.

(3) Gibberellic acid applied to Zante currants increased dried fruit yield by 30 per cent. and berry size by 170 per cent.

(4) The optimum cropping level for Black Muscat grapes in the Counties of Cumberland and Camden has been determined at 112 bunches per vine.

(5) Diphenylamine sprays reduced scald of Granny Smith apples in cool store.

(6) Polythene film as box-liners considerably extended the cool storage life of pears and some apples.

(7) Two new apple varieties, one a Departmental cross and the other a chance seedling, have been selected for field trial.

(8) Plastic mulch improved the yield of first year strawberry plants by 28 per cent.

(9) Apple trees sprayed by Thiram for fungicidal purposes continue to out-yield those sprayed with lime sulphur.

(10) The Department's new cherry varieties, Ransom, Regina and Rival have been distributed.

(11) Sprays of 2,4,5-TA advanced apricot maturity and increased fruit size.

(12) The strawberry variety "Bountiful" selected by the Department has been released.

(13) Foam waxing of citrus for prevention of wastage has been adopted commercially, following research and investigations at Gosford.

(14) Fumigation with ethylene dibromide after harvest will control fruit fly larvae in oranges.

(15) Trifoliata stock confers frost-resistance to young Valencia orange trees.

(16) Stem-pit of grapefruit was transmitted by budding.

(17) Trifoliata seedlings did not succumb to twelve weeks waterlogging in glasshouse plots.

(18) Citrus hybrids from breeding work have been selected for future testing as commercial varieties and rootstocks.

COMMITTEES AFFECTING RESEARCH

Co-ordination Committee for Fruit and Vegetable Storage Research.—This Committee, comprising representatives of the Commonwealth Department of Primary Industry, the C.S.I.R.O. and the six State Departments of Agriculture, met in Adelaide. A bulletin on the ship storage recommendations for fresh fruit and vegetable carriage is to be published. Steps to improve further the co-ordination of fruit and vegetable storage research were planned.

Fruit Cool Storage Investigations Advisory Committee.—This committee, comprising representatives of the C.S.I.R.O. Division of Food Preservation, the Sydney University, and the Division of Horticulture, met to review the fruit storage investigations carried out by the three organisations at the Homebush Laboratories, the Plant Physiology Unit at the University of Sydney, and the Citrus Wastage Research Laboratory, Gosford.

Citrus Wastage Research Committee.—This Committee, a sub-committee of the Advisory Committee on Fruit Cool Storage Investigations, met twice during the year to review and plan the work of the Citrus Wastage Research Laboratory at Gosford.

Fruit and Vegetable Processing Research Committee.—This Committee, comprising officers of the C.S.I.R.O. Division of Food Preservation and Transport and this Department held two meetings. All current investigational work in fruit and vegetable processing was reviewed, and future work was planned.

Commonwealth Dried Fruits Processing Committee.—This advisory Committee deals with all technical aspects of the dried fruits industry. The 1958 annual meeting was held in New South Wales. Technical problems relating to rack dehydration and dipping of sultanas, and the sulphuring of fruits for drying, were considered.

Australian Canning Convention.—An officer of the Division of Horticulture is acting in the Secretariat responsible for planning and holding the Ninth Australian Canning Convention, to be held in Sydney in September, 1959. Representatives of growers, canners, technologists and other sections of the fruit and vegetable canning industry will there discuss problems on an Australia-wide basis.

N.S.W. Canning Fruits Advisory Committee.—This Committee, comprising representatives of canners and growers, with an officer of the Division of Horticulture as Chairman, was established by the Canning Fruits Industry to progressively review canning fruit plantings and to make recommendations to the industry. It has recommended that further plantings of clingstone peaches be restricted to those sufficient to replace annual removals.

M.I.A. Rehabilitation Committee.—This Committee carried out a rehabilitation scheme for horticultural farmers in the M.I.A. An officer of the Division of Horticulture was a full-time member of the Committee until it disbanded on 13th March, 1959.

Assistance was requested by 240 farmers, and advances totalling £458,671 were made available from Rehabilitation Funds. The major form of assistance comprised advances for installation of tile drains; and 3,503 acres were drained on 119 farms. Eleven farmers were offered new horticultural farms, and £97,500 was made available to assist in their development.

Apart from these direct aids, the work of the Committee had a stabilising influence on the fruit industry of the M.I.A.

Deciduous Fruit Tree Improvement Committee.—This Committee was inaugurated during the year with the object of controlling the spread of virus diseases in the deciduous fruit tree orchards of the State, and in particular to prevent the propagation of infected trees. The Committee consists of officers of the Division of Horticulture and the Biological Branch, Division of Science Services. The five meetings so far held have been devoted to studying the project and planning future work.

Technical Committee on Fruit Fly Sterilisation Investigations, in Citrus.—This Committee, comprising representatives of the Commonwealth Department of Primary Industry, the C.S.I.R.O., and the State Departments of Agriculture of South Australia, Victoria and New South Wales, directs the fruit fly commodity treatment investigations. This work is centred at the Citrus Wastage Research Laboratory, Gosford (see later).

RESEARCH LABORATORIES AND EXPERIMENT FARM ORCHARDS

More detail of projects at the following institutions and other sites of research will be found later in this report, under the respective fruit industry sections—Tropical, Pome, Stone, Citrus, Viticultural, etc.

Citrus Wastage Research Laboratory, Gosford.—Citrus wastage investigations in hand and programmed by the Advisory Committee (see earlier) include trials related to export oranges from the Lower Murray area, in co-operation with the Victorian Department of Agriculture.

"Foam" Method of Wax Coating Citrus: One of the most recent developments from the Laboratory has been the "foam" method of applying wax coatings to citrus fruits. It has considerably reduced waxing costs. The method is now being successfully used by commercial citrus packing houses.

Fruit Fly Sterilisation in Citrus: Commodity treatment investigations are in progress, planned to enable fumigated or otherwise treated citrus fruits to be safely exported from fruit fly areas without risk of fruit fly being carried to the importing country. The effectiveness of a fumigation treatment has been proven. The present work concerns problems of commercial application of the method.

Citrus Experiment Station, Gosford.—There are two sections, Narara and Somersby. Main activities at Narara Section are fruit tree propagation, horticultural investigations, and production of Phylloxera-resistant grape-vine stocks.

Citrus Field Trials, Somersby and Narara Sections: Somersby Section comprises, entirely, citrus field trials. It is in the process of active development, following recent establishment. The first commercial crop was harvested in July, 1958. Two new citrus field trials were established in Somersby Section this year, and two more were established in Narara Section.

Citrus Arboretum, Somersby Section: The Citrus Arboretum is established and being extended.

Phylloxera-resistant Vine Stocks, Narara Section: Some 17,000 vine cuttings produced at Yanco Experiment Farm were planted in Narara Section, and this greatly increased the viticultural propagations. A total of 49,530 cuttings was planted, and 26,250 rootlings were produced. The planting of cuttings from Yanco Experiment Farm is a new development.

Griffith Viticultural Nursery.—Owing to salt damage, conditions at the Station were merely maintained. No new trial was initiated. It is likely that the number of Phylloxera-resistant grape-vine cuttings will be at least as great as last season and perhaps better. There was a good strike of all varieties planted and rootlings available should exceed the previous year's total.

Yanco Experiment Farm Orchard.—Installation and testing of the pump and pipelines supplying the new citrus area have been completed. The present system of surface drainage for the old orchard is inadequate and requires a complete overhaul.

Severe frosts in June, 1958, extensively damaged the citrus and caused complete loss of the Valencia and lemon crops.

Land preparations are progressing satisfactorily for citrus and pome fruit plantings allocated for 1959.

Lower Murray Research Station Orchard.—An additional 280 acres has been acquired from the Water Conservation and Irrigation Commission. Additional trees were planted in the stone fruit demonstration block. More ornamental and wind-break trees were planted to the landscape design.

Citrus propagation has continued and trees are now ready for planting in spring, 1959. A total of 2,300 trees was budded, and seedlings have been raised for further propagation work next year.

Short-term trials on citrus, strawberries and vines are continuing.

Bathurst Experiment Farm Orchard.—A heavy crop of apples and pears was harvested. Additional data on apple breeding and apple and pear stock trials was recorded.

New England Experiment Farm Orchard.—A large section of the old orchard is undergoing renovation, preparatory to planting a new series of trials.

Gravenstein "Twist" and "Non-Twist" Trees: The demonstrational block of "Twist" and "Non-Twist" Gravenstein apples trees has been maintained. It continues to provide an excellent example in practical control of the condition.

Pome Rootstock and Variety Trials: Apple and pear rootstock and variety trials are continuing.

Tropical Fruit Research Station, Alstonville.—Development of the new Station has speeded up appreciably. An officer-in-charge took up duty in May, 1959—Mr. D. S. Leigh, formerly Fruit Officer at Parramatta. A temporary, renovated residence has been provided. An administration block has been erected and plant, equipment, and stores purchased. A survey of prepared sites for an irrigation storage dam has been done by Water Conservation and Irrigation Commission officers. Initial projects have been determined.

Tropical Fruit Research at Duranbah Plot.—Duranbah Demonstration Plot continued to handle small projects and pilot trials, in the following directions:—Banana Desuckering Trials; Banana Variety Selections; Banana Packing Trials; Avocado Seed Treatments for disease control; Avocado Seed Storage Life; Passionfruit Rootstock and Propagation Methods; Zinc Deficiency in Bananas; Banana Pests and Diseases control; Mango Propagation methods; Litchi Nut trials, and Propagation Methods; Macadamia Nut Propagation Methods; Banana Production Costs and Returns, etc.

RESEARCH, ON A FRUIT INDUSTRY BASIS

Research—Tropical Fruit Industry

Establishment of Alstonville Tropical Fruit Research Station is reported earlier. Initial projects have been determined. Meanwhile, at Duranbah Demonstration Plot various investigational as well as demonstrational projects have been continued and others initiated.

Desuckering Trial with Bananas.—This trial was initiated as a plant physiology study, to determine—(a) number of leaves developed, from the peeper sucker stage to bunch emergence; (b) number of months which this cycle takes; (c) number of sword leaves developed; and (d) the period of growth at which the broad leaves commence. From the time of emergence of the sucker and the month in which the bunch is cut, it was possible to lay out a trial of Cavendish plants which should mature bunches in the winter months.

Selection of Banana Varieties.—This trial was initiated to obtain plants which would form a nucleus for planting material of future plantings. Six Cavendish plants have been

selected for their superior qualities. The Highgate variety from Trinidad has been multiplied with a view to developing a small commercial planting on forest soils.

Banana Packing Trials.—Present case trials include packing bananas in open crates, tropical cases and banana cases; in hands and part-hands. Early consignments of hands and part-hands were pre-packed in polythene envelopes and despatched to Sydney market. A more recent consignment of hands was despatched to Western Australia. The nine-day journey may emphasise the value of polythene packaging.

Avocado Seed Treatments for Root-rot Control.—Treatment of Avocado seeds by hot water and chemicals has been carried out, in an effort to produce seedlings free of the root-rot fungi *Phytophthora cinnamomi*. The seeds were immersed in hot water at 120-125 degrees F. for 30 minutes. Seeds have also been immersed in a phenol mercuric chloride solution in an endeavour to reduce early attack on the seed by soil-borne diseases.

Storing Life of Avocado Seed.—It has been found that the storage life of avocado seeds can be greatly increased by treating the seed with an .01 per cent solution of phenol mercuric chloride, and storing in polythene bags. Seed which is extracted from mature ripe fruit should be thoroughly dry when placed in polythene containers.

Passiflora Rootstock Trial, and Grafting Method.—*Passiflora flaviocarpa* is under trial as a stock for the purple *P. edulis* variety. The grafting method adopted is a wedge graft placed about 2 inches above the ground level when the stock has reached a diameter of about 3/16 inch. Plants grafted in the autumn resulted in 90 per cent. success in takes.

Rainbow Leaf in Bananas (Zinc Deficiency).—For many years a chlorotic condition of banana leaves has been recorded in association with certain soil types. In 1955, a range of trace elements was applied to an area at Stokers Siding but no conclusive result was obtained. In 1956, a larger area showed similar symptoms on a plantation at Cudgera; and it was decided to treat this with a similar range of trace elements.

A spectacular response to zinc was obtained. Photographic records in colour present a striking illustration of results. This is the first time on record in this country that a trace element deficiency symptom in bananas has been determined.

Cercospora Leaf Spot.—Division of Horticulture has been closely associated with Biological Branch, Division of Science Services, in the study of control of *Cercospora* leaf spot of bananas by low volume misting. The leaf spot work has been mainly located in the Richmond River district and the district Fruit Officer has been responsible for application of treatments and practical assessment of misting power units for this work. A small section of this work has also been located at Duranbah Plot to observe results from varying rates of oil per acre.

Banana Nematode Investigation.—Division of Horticulture is co-operating with Biological Branch also in an investigation of the nematode problem. This work, first initiated at Cudgera, has developed into a project designed to provide evidence on the practicability and efficiency of:—(a) Pre-treatment of planting material; (b) pre-planting treatment of soil; (c) soil treatments in established plantations; and (d) methods of application.

Mango Propagation Research.—Propagations by grafting, cuttings and air-layers have been tested. Fair success has been obtained by grafting, and mango trees grow satisfactorily from cuttings. Air-layers are carried out by cincturing the tree and applying suitable humus and soil moisture to the area. Wrapped by polythene wraps, root development occurred as early as five months after application.

Litchi Trial and Propagation Research.—The imported trees from Hawaii have progressed satisfactorily. Propagation from these trees will be carried out, for the transmission to Alstonville. Air-layering has been successful, using the same technique as with the mangoes.

Macadamia Propagation Research.—Investigation of propagation techniques is continuing, but results so far are not encouraging.

Research—Pome Fruit Industry

Storage Research.—Detailed investigations continued in co-operation with the C.S.I.R.O. Division of Food Preservation and Transport at the Homebush Laboratories.

The experiments on the effects of carbon dioxide and oxygen levels on disorders and fruit quality in Granny Smith apples have been continued. Superficial scald was unusually severe in 1958 and was not affected by the various storage atmospheres. When it was controlled with diphenylamine (D.P.A.) the best atmosphere for long storage of Granny Smiths was 5 per cent. carbon dioxide and 2½ per cent. oxygen. This atmosphere has also given best results with pears; greatly increasing storage life.

Very satisfactory control of superficial scald was again obtained by pre-harvest spraying with diphenylamine (D.P.A.). Even after post-harvest application of sufficient D.P.A. to inhibit severe scald, residues in the fruit after cool storage were low. A quantitative relation has been established between the amount of D.P.A. taken up by the fruit and the degree of control of scald.

When the fruit was pre-cooled before packing, the Williams, Packhams, Bosc and Winter Cole varieties of pears kept excellently in sealed polythene liners, and much longer than is possible by ordinary methods. Polythene liners are now being successfully used commercially for pears and some apples. When pre-cooling is not practicable, slight perforation of the liner helps to avoid risk of fruit injury.

When the increased scald was controlled by the use of diphenylamine (D.P.A.), Granny Smith apples stored particularly well in polythene; but the liners increased breakdown in susceptible lines of Jonathans and Delicious.

Tree Nutrition, and Fruit Quality in Apples.—This study was continued during the 1958 season with the variety Delicious, in co-operation with the Chemist's Branch, Division of Science Services. Nutritional status was determined by analyses of leaves and fruit, and quality was assessed by means of cool storage tests and specialised tasting tests.

There were differences between orchards, in both nutrient content and fruit quality; but the relationship between the two was not clear, although not consistent with previous findings and published data. It was apparent that methods of sampling are of critical importance.

Spray Residue Removal.—Co-operative investigations with the Chemist's Branch demonstrated that residues of lead arsenate on apples and pears can be removed in a bath of weak acid. Preliminary trials indicated the possibility of removal of D.D.T. with a double bath in a weak acid and an alkaline detergent.

A survey of the levels of the residues on apples and pears following various common spray programmes is continuing. So far, only lead arsenate, D.D.T. and late sprays of mercury seem likely to present a residue problem at harvest.

Apple Rootstock Trials.—A five acre plot of Granny Smith apples on English clonal rootstocks and also some locally raised clones will be planted this season at Yanco Experiment Farm. This would be of particular interest to the M.I.A., where only the Granny Smith variety is grown.

The new rootstock trial planting at Bathurst Experiment Farm will also be extended this season.

Granny Smith trees on Northern Spy stock budded 24 inches above ground level out-yielded all other treatments in 1958-59.

Trees on Granny Smith Seedling and Malling XII produced few fruit of commercial value this season in trials at Wagga Agricultural College and Experiment Station.

Chemical Thinning.—Further work at Bathurst Experiment Farm using naphthalene acetic acid has demonstrated that, although the effect is not great, chemical thinning tends to reduce the wide fluctuations in the alternate bearing habit of apples. Applications of nitrogenous fertiliser had no effect upon alternate bearing and reduced the yield of fancy-grade fruit.

Pear Rootstock Trial.—All *Pyrus calleryana* selections under trial at Bathurst Experiment Farm were again outstanding. The selection D6 was out-yielded by P.C.4 to the extent of 1½ bushels, although the quality of fruit from the former was superior.

Apple Breeding for Black Spot Resistance, and Quality.—The large number of selections previously topworked is gradually being reduced.

One selection (BB.122/21) continues to show promise as an early mid-season red variety. It has indicated good resistance to black spot, and yielded well.

Another chance seedling under test has given good crops of well coloured fruit of good shape, ripening after Jonathan. Observations extending over six years indicate good resistance to black spot.

Influence of Spray Programme on Apple Yields.—In a four years' trial at New England Experiment Farm, apple trees sprayed with Thiram out-yielded trees sprayed with lime sulphur by 22 per cent. Fruit size and number of fruits per tree were also greater.

Grass Control in Orchards.—The kill of annual grasses with "Dalapon" was very good; and the few surviving perennials were killed by all strengths up to four times normal without adverse effect on apple trees.

Research—Stone Fruit Industry

Stone Fruit Variety Trials.—Locally raised and introduced varieties of peaches, nectarines, apricots and plums are continuously under trial on Experiment Stations and private orchards in all the main fruit-producing districts. Further introductions of peaches, apricots, plums and strawberries were made during the year, and locally raised seedlings also were selected for trial.

Stone Fruit Trials in Declining Citrus Areas.—Additional stone fruit variety trials have been established in coastal areas, to gain information on the possibilities of early stone fruits in the reconstruction of declining citrus orchards.

Department's New Cherry Varieties under Test.—Appreciable numbers of trees of the new cherry varieties Ransom, Regina and Rival produced by this Department were recently distributed to the main cherry growing districts for testing.

Canning Peach Variety Trial.—Golden Queen peach trees at Yanco Experiment Farm produced a canning yield of 115 lb. per tree. Phillips and Gaume produced 60 lb. per tree, being the highest yield of the varieties maturing earlier than Golden Queen. The next in order of merit were Ellis and Fairless.

Peach Pruning and Thinning Trials.—Pruning and thinning trials at Yanco Experiment Farm to test the value of the long lateral method of pruning Golden Queen peaches did not demonstrate any difference in yield compared with orthodox pruning.

Pre-harvest Drop of d'Agen Prunes.—Pré-harvest drop was negligible in all plots at Yanco Experiment Farm; however, trees subject to an irrigation treatment involving "wilt" during the early stages of fruit growth out-yielded by 16 per cent. trees which were not "wilted".

Annual vs. Biennial Pruning—d'Agen Prunes.—Annually pruned trees out-yielded biennially pruned trees by 8 per cent. in trials at Yanco Experiment Farm. Both series of plots were pruned in the winter of 1958.

Soil Fumigants, and Prune Replanting.—The use of soil fumigants, Vapam, ethylene dibromide and ethylene dibromide plus chloropicrin, considerably improved the establishment of young prune trees in Young district. Untreated trees were retarded in growth, and dieback was pronounced. Trees on Buck plum (PH5) rootstock were well established even without soil fumigation.

Plum and Prune Rootstock Trials.—Plum and prune stock trials are located in all appropriate districts and the older established areas now are yielding valuable information on the performance of various types and strains of stock.

Buck plum (PH5), raised and developed by this Department, has proved much superior to the standard rootstocks and is now being recommended for d'Agen prunes and plums on the tablelands and in irrigation areas. Investigations have been undertaken to develop improved methods of propagation for PH5.

To continue and extend the rootstock work, further plum stock material was introduced recently.

Effects of Hormones on Size and Maturity of Apricots.—Apricots sprayed with 2,4,5-TA at 25 and 50 p.p.m. concentrations, at the commencement of stone hardening, showed increased fruit size and earlier maturity; particularly at the higher rate. Shoots suffered some injury and leaves exhibited undesirable malformation. Therefore the practice is not recommended for commercial application.

Internal Breakdown of Apricots.—The incidence of breakdown in trials at Yanco Experiment Farm followed the same pattern as in recent seasons. The degree of breakdown increased as the quantity of sulphate of ammonia applied increased.

Research—Citrus Industry

Control of Wastage in Citrus Fruit.—Investigations into the control of wastage in citrus fruits were continued at the Gosford Citrus Wastage Research Laboratory; operated jointly by the C.S.I.R.O. and this Department. Some account of the work is recorded earlier in this report, under "Citrus Wastage Research Laboratory, Gosford".

Mould Wastage Control.—Further work has been undertaken in the use of sodium ortho-phenylphenate in the "rinse" and wax emulsions for the control of mould wastage; to extend the period of protection beyond 3 to 4 weeks.

In preliminary trials, sodium salicylanilide used after a sodium ortho-phenylphenate rinse has proved promising.

Undecylenic acid as a dip gave good control of green mould; but results with "Plastin" liquid dip and "Plastin" paper bags would not warrant their further trial.

The "foam" method of applying a wax coating to citrus has been worked out in considerable detail, and several packing houses have already put the method into practice.

Cleaning Citrus Fruit.—Sodium hypochlorite has been shown to be a more effective and easier method of cleaning citrus, under usual farm conditions, than the previously recommended chloride of lime dip.

Black Spot of Valencia Oranges in Storage.—Application of a wax coating of 0.5 per cent. sodium ortho-phenylphenate materially reduced the development of black spot in Valencia oranges during a nine-weeks storage period. The wax and the sodium ortho-phenylphenate each contributed to the effect.

Testing for Maturity; Mechanical vs. Hand Reamers.—In tests of mechanical reamers against various types of hand reamers there were no consistent differences in juice acidity; but wide variation as between duplicate samples indicated that a sample of five fruits was too small. Mechanical reaming with a large reamer removed 5.4 per cent. more juice from Navel oranges and 3.8 per cent. more juice from Valencia oranges than did hand pressure on a small glass lemon squeezer. The percentage of juice extracted varied according to the size, shape of cone, and the sharpness of the cutting ridges of the reamer.

Fruit Fly—Sterilisation of Fruit.—Work has commenced on the fumigation of infested fruit at temperatures lower than 70° F. in order to determine the dose rate necessary for 100 per cent. mortality of larvae in temperatures ranging from 40° F. to 70° F. In previous work no surviving larvae was noted, in 77,583 larvae counted, in 93 standard fumigations of infested fruit—using 16 oz. of ethylene dibromide per 1,000 cubic ft. for two hours at 70° F. or more.

Resistance of Trifoliata Selections to Waterlogging.—Several strains of trifoliata rootstock have been subject to waterlogging conditions at Gosford Citrus Experiment Station to study closely their resistance to such conditions.

Trifoliata Rootstock Strain Trial.—A trial to test the various strains of trifoliata rootstocks is being conducted at Griffith Viticultural Nursery. The vigorous growth of these trees has made further thinning out of this planting desirable.

Scaly-butt Transmission.—A trial at this Nursery demonstrating the transmission of scaly butt virus by budding continues to provide first-class extension material.

Permanent Investigational Plantings at Gosford Citrus Experiment Station.—Further plantings have been made at both the Somersby and Narara Sections of this Station. These plantings, 16 acres at Somersby and 10 acres at Narara, are for investigations into rootstocks, root and virus diseases, scion varieties, and species of citrus.

Citrus Virus Indexing Programme.—An area of 2 acres had been prepared for this purpose at Somersby Section to accept the first plantings in September, 1959.

"Joppa Ring" and Xylopsorosis Investigations.—A new plantings of about an acre at Narara Section is for investigations into these diseases.

Research—Wine and Table Grapes Industries

Molong Trial of Wine Grape Growing.—About 1 ton of grapes was harvested from the experimental plot at Molong, and processed at Penfolds Rooty Hill cellars. Quality of the grapes was good and the young wine is sound although somewhat high in acid. The wine from the 1957 crop has been bottled.

Difficulties encountered in ageing such a small, experimental lot, have affected the quality of the mature wine. It is not as high as previously expected. Consequently, a portion of the current season's wine will be bottled early and evaluated as a young wine.

The lease on the experimental plot at Molong has been extended until July, 1960; but it may be possible to end the trial earlier.

Rootstock Trials—Table Grapes.—A trial to test the performance of Black Muscat on eight different rootstocks was planted at Orchard Hills in 1958. The vines have developed satisfactorily.

A further lot of vines has been raised, to plant an identical rootstock trial in the Chipping Norton district during the current winter.

Improving the Strike of Phylloxera-resistant Cuttings.—Preliminary experiments in 1957-58 indicated that treatment of cuttings with the hormone, naphthalene acetic acid, and dipping in Bordeaux mixture prior to planting, may appreciably improve the strike. Treatment with the mercuric fungicide, Areton, depressed strike. The position of the cutting, along the cane, had no appreciable effect.

Experiments in 1958-59 involved treatments with the hormones, N.A.A. and 2,4,5-T, dipping in Bordeaux mixture, and comparing the strike of stratified and unstratified cuttings. Results have not yet been assessed.

The 1959-60 trials have been commenced. They will compare the strike of cuttings made in the autumn and winter; half of each lot being treated with various concentrations of indole butyric acid. Also, the effect of hormone treatment of the mother vines during the growing season—in relation to the strike of the resultant cuttings, will be examined.

Trial of Gibberellic Acid on Zante Currant.—The growth-promoting substance, Gibberellic acid, was tested against cincturing and the standard fruit-setting hormone, P.C.P.A., in a comprehensive trial on Zante currant at Coomealla.

All Gibberellic acid treatments gave an increase in yield over cincturing; but the highest yielding treatment, a 20 p.p.m. spray at full bloom, was only equal to the standard P.C.P.A. spray of 20 p.p.m. applied at full bloom. Each increased the yield of fresh fruit by about 50 per cent. and dried fruits by 30 per cent.

Gibberellic acid caused a marked increase in berry size, proportionate to the strength applied. Berry size from vines sprayed with 20 p.p.m. at full bloom was about 70 per cent. higher than P.C.P.A. treated vines, and 170 per cent. higher than cinctured vines.

Gibberellic acid also elongated the berries, increased bunch length and, by increasing shattering, resulted in looser bunches. Such bunches had a greater tolerance to adverse weather conditions, despite the larger berries.

Ripening of Black Muscats as Affected by Crop Level.—Experiments during 1958-59 confirmed the finding of the previous year, that the crop level per vine of Black Muscat table grapes has a strong influence on maturity and quality. The optimum cropping level under normal conditions in the Counties of Cumberland and Camden was found to be close to twelve bunches per vine.

Exceptionally early fruit of high quality can be obtained by harder pruning and heavier thinning, but yield is reduced accordingly.

Effect of Pruning Method on Crop Size; thence Maturity and Quality.—Endeavours were made to ascertain whether certain methods of pruning would allow a vine to carry heavier crops of a standard maturity and quality. The results are not completely analysed, but indicate that little can be achieved in this respect.

Chemical Weed Control in Vineyards.—A block of 100 White Shiraz rootlings has been planted at Hawkesbury Agricultural College, for testing grape vine tolerance to various weedicides. Weedicides will be applied to the vines during the coming season when the vines are sufficiently established.

Irrigation Investigations—Wine Grapes.—Preliminary experiments were commenced at Griffith. These were to examine the effect of timing and frequency of the final irrigations prior to harvest; on yield, sugar development and quality, of five different wine grape varieties. Unfortunately, abnormal rains interfered with the irrigation treatments, but useful information was gained for the planning of future experiments.

Grape Storage—Mould Wastage Research.—The storage of grapes in polythene case liners is under investigation. Experimental work is based on the need to control mould wastage in storage. Sodium-ortho-phenylphenate, potassium metabisulphite, and ammonia, have all given promising results.

The Need for Experimental Grape Plantings.—The need for permanent experimental grape plantings has become urgent. Plans are in hand to commence the propagation of vines for such plantings in the winter of 1959. The experiment would be ideally located at Griffith, although other sites are available.

Tile-drainage tests conducted at Griffith Viticultural Nursery in the autumn of 1958 showed that the Nursery can be successfully and economically tile-drained. A decision on the future of this Nursery has not been reached.

Research—For Strawberry Growing

Strawberry Improvement.—This project is aimed at developing new virus-free varieties of high commercial quality, and of maintaining mother plants of selected commercial varieties. A limited number of open-pollinated, cross-bred and selfed seedlings are tested each year.

The programme resulted in the release of "Bountiful" during the past season. The previously promising selection N56/7 has been rejected for further trial as being too disease susceptible. However, N58/5 is now subject of final tests at the Bathurst, New England, and Gosford Experiment Farms.

Weed Control in Strawberries.—In co-operative experiments with Division of Plant Industry, "Neburon" gave considerable promise for the control of weeds in strawberries; used either alone or in conjunction with D.N.B.P. Results with 2,4-D and E.H.I. were not encouraging.

Fruit Industry Trends

TROPICAL FRUIT PRODUCTION

Good spring rains were recorded throughout the north coast this year, contrary to most years; and satisfactory falls continued through the summer and autumn. Growth and production were accordingly good, in respect of all tropical fruits; bananas in particular.

BANANA INDUSTRY TRENDS

Banana Acreage Increases.—The total acreage of bananas is now 29,659, an increase of 1,245 acres; and there are now 4,605 commercial growers. Of the two main commercial varieties, 21,941 acres, or 74 per cent., are planted to Williams, and only 7,718 acres to Cavendish.

Record Banana Production.—The record production of 3,036,760 cases from 26,154 bearing acres (a record), an average of 116 cases per acre (also a record), led to a record period of glut conditions—February, March and April, 1959. The industry was not able to cope with the production, and much fruit was sold at extremely low prices.

Suggestion of Market "Quotas."—Considerable concern is evident throughout the industry; and lively discussion is taking place on the desirability of implementing a system of "quota" marketing for periods of glut supplies. A plebiscite will be taken on this matter in the coming year. Division of Horticulture has supplied a list of commercial banana growers, from which the nominal roll of producers will be compiled.

Merchant System of Marketing Favoured.—A poll of growers was held in October, 1958, to determine whether the merchant system of marketing on the Sydney market should be retained. The result was in favour of the system.

Transport Improved.—Transport services have improved appreciably for the Banana Industry, by the provision of additional and faster trains.

Mechanisation of Banana Industry.—Mechanisation of banana growing has now attained general application. The bulldozer plays a big part in present-day land preparation, enabling more efficient clearing, road making, and water storages at relatively cheaper costs. Small crawler tractors and four-wheel-drive vehicles are increasingly popular. Low-volume misting treatment for control of leaf spot in bananas has caught the imagination of growers, and its large-scale use seems certain. The possibility of using helicopter aircraft for this purpose is also under their attention.

POME FRUIT INDUSTRY TRENDS

Good seasonal conditions resulted in a splendid crop of good quality apples and pears throughout all districts except the Murrumbidgee Irrigation Areas. There the crop was the lightest for many years. Although an "off" crop-year, conditions gave rise to a marketed total almost the same as the previous "on" year, when 274,000,000 cases were harvested.

Although growing conditions were excellent, growers' improved cultural methods, spraying, fertilising, pruning, and thinning, undoubtedly played a big part in this wonderful "off" year crop.

Six Main Areas of New Plantings.—There is a marked tendency to confine new plantings to six main areas—Ballow, Orange, New England, Bilpin, Oakdale and the M.I.A. Production in the Orange district has increased from about 500,000 to about 700,000 cases per season (av.); and, as young trees mature, production is confidently expected to reach the 1,000,000 case mark in this district.

In the coastal districts, particularly Bilpin, there is a tendency for non-resident farmers to enter the industry and plant small, uneconomic units.

Trend in Automatic, Air-blast Spraying.—In all the main districts there has been a change to automatic spraying with air-blast types of spray units. As much as two-thirds of the acreage in some districts is sprayed with this type of machine.

Fibre-board Cartons, Reaction.—The use of fibre-board cartons in place of wooden cases has not increased appreciably during the year. Most growers consider them too expensive. This factor, together with opposition by agents in the markets and the cartons' limitations for cool storage, has precluded their general use.

The imminent use of automatic packing machines, usable only with cartons, may soon be a deciding factor in cartons' popular usage.

Organic Fungicides in Black Spot Control.—In most districts organic fungicides have largely replaced lime sulphur in post-blossom spraying for black spot control. This factor has contributed in no small way to the higher and more consistent pome fruit yields in recent years.

Poor Quality of Imported Oiled Wraps.—These wraps, for the control of scald in Granny Smith apples have again caused concern, since imports of wraps have been restricted to purchases from sterling countries. Oiled wraps are necessary to the effective storage of the Granny Smith apple. This matter has been taken up by the Standards Association of Australia. It will shortly promulgate effective standards for oiled wraps.

Shortage of Young Pear Trees on D6 Stock.—This is not likely to persist next planting season. There are now other sources of supply of D6 seed besides the Department, and in any case the demand for pear trees is declining.

Cool Storage Increases.—Provision for cool storage of apples and pears continues to increase steadily, particularly in the Orange district. There, additional growers' stores totalling 42,000-case capacity have come into operation this year.

There are now thirty-six growers' cool stores, with an aggregate space of 214,000 bushels, in the Orange district. The co-operative stores can accommodate 250,000 cases, so space is available in that district for 464,000 bushel cases.

Total cool storage space available in country growing areas of New South Wales at present totals 953,350 cases. Metropolitan stores provide an additional 196,500 case space. Thus, total storage space in New South Wales is 1,150,350 bushel cases.

STONE FRUIT INDUSTRY TRENDS

Production.—Seasonal conditions favoured stone fruit throughout the State, and overall crops were of high quality with good yields, although canning peaches were down 4,500 tons compared to normal.

Canning Peach Acreage Recovering.—The acreage of canning peaches lost in the 1956 wet season has now been largely replaced, but the bearing acreage is approximately 1,000 acres below the pre-1956 figures. The removal rate over the next few years will be above average, as there are still plantings declining rapidly as a result of the 1956 damage. This decline will be overcome by the number of young trees reaching bearing age. Thus, the bearing acreage will show a definite upward tendency for the next few years.

Dessert Peach Acreage Increasing.—Plantings in most of the recognised dessert peach-growing areas have expanded. In the Bathurst district peach plantings in 1959 are expected to be the heaviest for many years.

A steady replanting of old citrus land to peaches continues in coastal and near-coastal areas.

Much interest is being shown in the planting of mid-season and late-maturing varieties, and the variety Halehaven has become one of the most popular for planting in all areas.

Apricot Acreage Has Declined.—The area under apricots in the M.I.A. is now some 240 acres less than prior to the 1956 wet season; and there are still plantings declining in health, reflecting probable damage in 1956.

There has been very little expansion of the small areas of early and late dessert apricots grown in coastal and high-land areas.

Prune Acreages in Balance.—Production of prunes in the Young district is likely to decline gradually, as most plantings are between 30 and 40 years of age. New plantings being made are no more than maintaining balance with the original acreage.

There is an upward trend in total bearing acreage in the M.I.A. and with heavy plantings over the past two years this trend will continue. The variety d'Agen is increasing in popularity, and the proportion of Robes in the total plantings is diminishing.

The majority of trees are now under 20 years of age, which will tend to raise the average quality of fruit produced and reduce the quantity of small fruit.

Cherry Acreages Expanding.—Extensive plantings of cherries have been made in the Young district over recent years and much interest is also being shown in this fruit in the Orange and Lakesland districts. New plantings on a smaller scale are being made there. The main factor limiting the plantings at present is shortage of nursery stock.

Emphasis is mostly on later-maturing varieties, particularly in the Orange district, but the Rons variety dominates all new plantings in the Young district.

Uneconomic New Plantings, near Sydney.—Subdivision of land near Sydney into uneconomic units is continuing; and, where stone fruits are planted on such areas the lack of experience, capital, and machinery seriously limit the chances of many of these plantings reaching profitable production.

Stone Fruit Increases Likely in Murray Districts.—In the Lower Murray and Mid-Murray districts considerable interest is being shown in stone fruits. Increased plantings there are indicated.

Shortage of Nursery Trees.—Fruit tree supplies continue to be short, due partly to wastage caused by crown gall infection. Nurserymen in the near-Sydney areas are considering giving up production of stone fruits, because of the serious incidence of crown gall.

Irrigation and Soil Drainage Equipment Increases.—The trend to use more up-to-date orchard equipment continues, with emphasis on irrigation and soil drainage requirements.

CITRUS INDUSTRY TRENDS

Production.—Adverse seasonal conditions seriously affected production. Severe frosts in July, 1958, ruined the crop in the Murrumbidgee Irrigation Areas, and considerably damaged the crop in the Murray River district. Trees in the M.I.A. with root systems injured by previous wet seasons suffered severely from frost, and many died.

Crops ranged from light in coastal districts to moderate in irrigated areas in the western districts. A large percentage of the crop in the M.I.A. was completely unmarketable because of severe frosts and the value of fruit marketed was much reduced.

Only 144,732 bushels of Valencia oranges were marketed as fresh fruit, from an estimated crop of 423,000 bushels, but factories accepted 72,000 bushels of the remainder, at salvage prices. Fruit from districts not affected by frost sold freely at remunerative prices. Despite action taken to prevent "dry" oranges reaching the market from frost-affected districts, some did get through; and buyers lost confidence in fruit from these districts.

De-greening of Oranges.—The de-greening treatment by exposure to ethylene gas was used more than usual, because of an unusually large intermediate crop of Valencias; the intermediate crop still has a green appearance though fully mature. The treatment causes the fruit to lose the green colouring, thus revealing the natural colour underneath.

Citrus Planting Trends.—Replacement plantings have been made in the Hawkesbury Valley, where substantial tree losses occurred due to floods in recent years. Navels on trifoliata rootstocks have been favoured in this locality.

New plantings in the M.I.A. have replaced removals and, although Valencias are preferred, interest in Navels is increasing.

Shortage of nursery trees has restricted new plantings on the Lower Murray and some settlers are raising their own trees. Valencias are preferred to Navels in this district.

New plantings have been made in the Narromine district and, although Valencias are preferred to Navels, interest in Ellendale mandarins is increasing in this area.

New irrigation areas have been opened up, at Cudgal near Leeton, and at Buronga on the Lower Murray; but plantings have not been possible in any quantity because of the shortage of nursery trees.

Trends in Cultivation Practices.—The trend is still towards minimised cultivation at shallow depths, associated with the growing of green manure crops in the autumn and winter. Sod-culture has proved disappointing, except in one instance, and has been discarded.

Trends in Types of Irrigation for Citrus.—Increasing areas have been placed under fixed or semi-fixed overhead spray irrigation, in both inland and coastal districts. Permeable light sandy soils suitable for citrus usually occur on undulating country and these conditions have influenced growers to instal fixed spray irrigation systems.

The availability and cost of labour has rendered the use of portable spray irrigation plants uneconomic.

Water storage in farm dams is popular amongst coastal growers, and many dams have been constructed. Bentomite clay is under trial as a means of overcoming seepage problems from dams.

Washing and Waxing, for Mould Prevention.—Cleaning citrus fruit by washing is increasing in popularity, with sodium-ortho-phenylphenate added for control of mould wastage. Associated with the washing process is the use of waxing treatments, to enhance fruit appearance and reduce shrivel. Adoption of the foam waxing method has helped to halve the cost of the waxing process.

Bulk Handling to Murray River Packing Houses.—Bulk handling from grove to packing house has become an established practice with a number of Lower Murray packing houses. Portable bins are being used in association with fork-lift trucks in the packing houses, and special loading gear in the orchard.

Hawker and Road-side Selling Methods.—The tendency to avoid selling on the wholesale market has intensified during the year. The hawker trade and roadside stalls are now handling an appreciable percentage of the citrus crop; and sales direct from the packer to retailing organisations are increasing.

DRIED VINE FRUITS INDUSTRY TRENDS

Production.—Conditions favoured the grape harvest, though heat waves in January caused losses in some varieties. Vine fruit drying conditions in the Murray districts were almost ideal, and the season finished as one of the best on record.

More Efficiency in Rack Dehydration.—Good progress continues in the expansion of rack dehydration for dried vine fruits. Plants are now more efficient and economic.

TRENDS IN WINE AND TABLE GRAPES INDUSTRY

Wine Grapes.—Some 24,700 tons of wine grapes were produced, compared with 23,496 tons in 1957-58, the highest recorded since 1954. Of the total, the M.I.A. produced 22,036 tons in 1958-59, compared with 21,082 tons in 1957-58.

Acreage of wine grapes in the M.I.A. has further declined, to 4,128 acres, but because of the cumulative price increases for most wine grape varieties, the industry is gradually becoming more stable. Competition amongst wineries for grapes is increasing. It is obvious that the district does not produce sufficient to satisfy requirements. Relatively large quantities are brought in from the Murray River districts.

In recent years there has been marked improvement in quality of M.I.A. wines, mainly through improved wine making techniques. This improvement will continue, provided planting high-quality wine grape varieties is maintained, and this depends on remunerative prices from the winemakers to the growers.

In the Hunter Valley limited planting of new areas is continuing. The acreage involved is only sufficient to balance uneconomic areas there.

Production from other non-irrigated districts was generally higher than in the previous year.

Wine production in New South Wales for the 1958 vintage was 4,150,146 gallons. It is estimated that 4,400,000 gallons were produced this year.

Table Grapes.—Production of table grapes in the M.I.A. was less than last year, owing to rain damage during harvesting. This caused the loss of 75,000 cases, mainly in Cornichon, Waltham Cross and Ohanez varieties. General improvement in quality and returns could be obtained by more widespread adoption of better pruning practices, designed to limit cropping.

From the County of Cumberland early consignments were of excellent quality. Towards the end of the season the quality deteriorated, due to wet weather. Total production from the district would be higher than in 1957-58.

In the Central Tablelands, table grape growers had a good season. Quality and production were high.

Phylloxera-resistant Rootstocks.—Sales of *Phylloxera*-resistant rootstocks for the 1958 planting season amounted to 21,915, compared with 23,725 and 36,575 in 1957 and 1956, respectively. The reduced sales in 1958 was due to a shortage of rootlings. Orders amounted to 63,265, compared with 42,575 in 1957. Orders for the 1959 planting season already amount to 82,300. Rootlings have not been lifted at this stage, but it is estimated that not more than half this quantity can be supplied.

Major replantings of mother vine blocks at Yanco Experiment Farm and Gosford Citrus Experiment Station have been completed. Some delay has occurred in the trellising of the mother vine block at Yanco. This has slightly retarded the young vines.

The effect of the replanting programme has already been reflected in increased production of cuttings in 1958, 16,000 higher than in 1957. Far greater increases are expected this year. By 1961 the production of rootlings will be more than doubled.

DIVISION OF DAIRYING

The activities of the Division comprised administration of Acts and Regulations, herd production improvement activities, and extension and research affecting the efficiency of the dairying industry.

Good seasonal conditions were experienced in the main dairying centres of the State and production increased some 15 per cent. compared with that of the previous year.

A dry spring was experienced, but heavy rain was received in December, January and February, and some minor floodings occurred on the Tweed, Richmond and other north coast rivers.

One hundred and two (102) claims were investigated for flood relief as a result of minor flooding in the Richmond, Clarence and Macleay Rivers.

In spite of these floodings, conditions were generally good well into the autumn and, with the lack of serious floods on the central and far north coast and a better distribution of rainfall, increased feed helped to raise production.

Production during 1958-59 is compared, in the following tabulation, with production during 1957-58:—

	1957-58	1958-59
Milk ..	287,000,000 gals.	325,000,000 gals. approx.
Butter	75,772,093 lb.	84,507,392 lb.
Cheese	9,002,981 lb.	11,298,105 lb.

Regulatory Services

DAIRY INDUSTRY ACT, 1915-55

Advisory Committee.—The Dairy Produce Factories Advisory Committee met on six occasions to consider new applications for registration, and on one occasion to consider a variation of an existing registration. All applications were approved.

Appeal Board.—The Appeal Board constituted under section 24, to deal with appeals against decisions of Inspectors under the Act, did not have occasion to meet.

Registration of Factories and Stores.—There were 99 dairy produce factories and 69 dairy produce stores registered under the Dairy Industry Act, as at 30th June, 1959.

Two dairy produce factories registered for butter manufacture and the testing and grading of milk and/or cream were deregistered, and one new factory was registered for cheese manufacture. A large co-operative (Norco) in the Tweed-Richmond area bought out the interests of a large proprietary company (Foley Bros.) and re-organised butter, cheese, dried milk and concentrated milk manufacture in the area.

Factory plant, buildings and machinery were kept at a satisfactory standard of construction and hygiene by the co-operation of factory managers, directors, and Dairy Officers of this Division.

Factory Renovations and Extensions.—Plans and specifications were received and approved for the extension of five factories and for the erection of four new factories.

These include:—

Factory	New or Extension	Product
P.D.S., Granville	New	Butter and Cheese Processing.
Norco Co-op., Lismore	Extension ..	Cheese Processing.
Dairy Farmers' Co-op. Milk Co. Ltd., Albury.	Extension ..	.....
Dairy Farmers' Co-op. Milk Co. Ltd., Robertson.	Extension ..	.....
Berriquin Co-op. Dairy Society Ltd., Deniliquin.	New	Cheese, dried milk, testing and grading.
C. Bakharas	New	Cheese.
P.D.S., Wagga	Extension ..	Butter Processing.
Hatzipilis, Gloucester	Extension ..	Cheese.
P. Russo, Moruya	New	Cheese.

Dairy Science Schools, and Certificates of Competency for Dairy Factory Operatives.—Six Dairy Science Schools were held throughout the State for the purpose of tuition and examination of 83 candidates for qualifications under the Act. In addition, many factories were visited by examining officers. to conduct examinations not covered by the schools.

Examination	Certificates issued
Cheese Making	17
Butter Making	20
Milk Grading	23
Milk Testing	45
Cream Testing	47
Cream Grading	36

The number of applicants for examinations indicated that interest in qualifying for the various certificates is being maintained in the industry. Where special classes were held by Dairy Officers the results were encouraging.

Butter Manufacture and Grading.—The Butter Grading staff made regular examinations of butter and cheese manufactured by New South Wales factories and received at Sydney, Newcastle, and Wollongong for distribution and storage prior to sale on the local market. Butter manufactured at Casino Co-op. Dairy Company also was examined, at that centre, prior to cold storage.

Resultant information in each case was furnished to factory managers and District Dairy Officers to assist in overcoming any quality faults or other manufacturing defects noted at the grading examination.

Considerable quantities of butter were imported into New South Wales from other States during late autumn, winter and early spring to supplement local production; and, at the request of the selling agents, the quality of this butter was checked by the Graders prior to distribution. In consequence, 5,403 grade notes were issued.

Boxes of butter from interstate and intrastate sources, examined by the State Graders, totalled 1,578,053 compared with 1,630,845 in 1957-58.

The services of officers as judges and stewards in the Dairy Produce Section of the R.A.S. Show, the North Coast A. & H. Society, Lismore, the Newcastle A. & H. Society, the Bega A. & H. Society and the Coff's Harbour A. & H. Society, and the competitions held in conjunction with the N.S.W. Division of the Aust. Dairy Factory Managers and Secretaries Institute, were availed of by these bodies as in previous years.

Analyses of moisture and salt content of butter manufactured at New South Wales factories were carried out, and the results forwarded to District Dairy Officers.

A bacteriological survey was carried out in conjunction with the Biological Branch, Division of Science Services, on butter manufactured at N.S.W. factories and arriving at Sydney, Newcastle and Wollongong selling floors during the seasonal peak months of November to April inclusive.

Special investigations of butter quality defects were conducted at 12 N.S.W. factories.

In addition to the aforementioned service, conducted by specialist officers in Sydney and at country centres, District Dairy Officers supervised the quality of milk and cream at site of manufacture into the various products.

This enables close supervision of quality control, and maintains close liaison between the farmer and the factory and between factory and distributor. This is reflected in the "Order of Merit" Scheme conducted by the Department to stimulate interest in quality uplift.

"Order of Merit" (Butter) Certificates.—To be eligible for consideration for an Order of Merit (Butter) Certificate of the N.S.W. Department of Agriculture, a factory must submit for grading during a season the following percentages, of its butter manufacture, branded as "choicest" quality:—

	Per cent.
March/April	25
October/December	45
January/February	65
Seven months period (overall) covering above months	65

The seven months in the periods from 1st March of one year to 28th February of the following year are regarded as comprising a season. The months May to September are normally low-production months and many factories are unable to submit sufficient butter for grading, therefore these months are not taken into consideration for the Order of Merit.

To qualify for an Order of Merit Certificate a factory, in addition to complying with the foregoing requirements, must also market true to choicest brand, at least 92 per cent. of its choicest-brand butter examined by Butter Graders of this Department and the Commonwealth Department of Primary Industry.

"Choicest Butter" Percentage.—The percentage of butter marketed as choicest quality during the year was 87.1 per cent., compared to 86.8 per cent. in 1957-58; and nine factories were awarded Merit Certificates.

The comparative figures for the previous four years are:—

1954-55—78.8 per cent.; three certificates issued.
1955-56—78 per cent.; two certificates issued.
1956-57—83 per cent.; two certificates issued.
1957-58—86.8 per cent.; four certificates issued.

Milk and Cream Quality Inspections, and Advisory Visits.—Officers spent 3,193 hours in dairy produce factories check grading milk and cream and the manufacture of other dairy products. One hundred and forty-five (145) visits were made in connection with check grading milk, and 298 in respect of cream.

As a result of these checks, 1,810 farms were visited to advise farmers how to overcome the defects. One hundred and thirty-two (132) special investigations were made on farms, for milk and cream defects, and 70 special investigations were made in dairy produce factories.

Cheese Trends.—The most significant trend in this section of the dairy industry is rapid increase in production of yoghurt and continental varieties of cheese. This is due to the influx of Southern European migrants. One of their staple items of diet is cheese.

Demand has led to a flow of New Australian cheesemakers into the industry. They are causing concern by participation in manufacture without the necessary premises, equipment, or registration under the Act. This uncontrolled manufacture necessitated strict policing, to enforce compliance with Regulations; and prosecutions will occur.

Production of Cheddar cheese has also expanded. Buoyancy of the market for this commodity has enabled factories to pay increased margins for milk for cheese manufacture.

Some trial batches of goat's milk were manufactured into hard pressed cheese; an effort to make a cheese which could keep for several months.

Cheese Grading.—Of cheese consignments received at Sydney and Newcastle, samples representing some 17,000 cheeses were graded.

Cheese quality was maintained but there is still room for improvement, particularly in regard to flavour defects.

Cheese Starter Propagation Troubles.—In association with officers of the Biological Branch, Division of Science Services, assistance was given to three cheese factories having trouble with starter propagation. In each case the cause was that the operators had departed from the recommended procedure for propagation of starter.

Other Causes of Cheese Manufacturing Defects.—On six occasions visits were made to cheese factories by specialist officers, in association with a District Dairy Officer; to ascertain obscure causes of manufacturing defects. On these occasions it was found that previous recommendations had been misinterpreted or neglected. The customary excuse was that time did not permit the recommended procedure.

Margarine.—Quotas for manufacture of table margarine to a total of 9,050 tons were issued to holders of certificates of registration of dairy produce factories for margarine manufacture.

Some 2,496 tons of table margarine were exported to other States. Permits to export table margarine overseas, to a total of 9,700 tons, were issued to firms; a total of 634 tons was actually exported.

DAIRY SUPERVISION ACT

Lack of adequate supervision of dairies is still causing unrest in industry circles and causing concern to public health authorities. This was recently highlighted by an outbreak of gastro-enteritis in the south; and a general demand for higher standards of hygiene, supported by adequate supervision.

Group Herd Recording Scheme—Inter-year Comparisons

Year	Number of Cows Recorded	Average Butterfat Production per Cow	Cost of Scheme						Total		
			Contributors								
			Commonwealth Government		State Government		Participating Farmers				
		lb.	£	s.	d.	£	s.	d.	£	s.	d.
1954-55	58,216	208	17,934	6	8	27,989	0	7	25,813	19	5
1955-56	65,000	215	19,879	14	0	31,619	18	9	28,019	3	3
1956-57	66,500	208	20,067	13	2	30,595	16	1	29,607	3	6
1957-58	54,479	203	Not Available.								
1958-59	45,000	..	Not Available.								

Calf Marking Scheme.—During the year, 6,301 heifer calves were marked in the Scheme, bringing the total to 62,440 calves marked. In the total there are 2,821 calves got by artificial breeding; including 664 for the 12 months ended 30th June, 1959; and 5,176 merit calves, including 149 for the current year.

Certified Bull Scheme.—Some 571 applications for certificates for certified bulls have been received and 394 certificates have been issued.

Calves got by certificated bulls are eligible to be marked as merit calves.

Sire Survey.—Due to staffing difficulties the compilation of Sire survey results for publication has been severely hampered. However, it is hoped to publish some results shortly.

Government Herds

Competitive Exhibits.—Representative teams from the Department's Stud Dairy Herds were exhibited at the 1959 Sydney Royal Easter Show with considerable success. The teams secured 15 First Prizes, 12 Second Prizes, and 10 Third Prizes.

Progeny of sires purchased overseas by the 1955 Stock Buying Delegation led by the late Hon. E. H. Graham, M.L.A. (then Minister for Agriculture and Food Production) secured a number of major awards.

The Guernsey exhibit from Yanco Experiment Farm was judged "Most Successful Exhibitor" in the Guernsey Section.

PURE FOOD ACT

No prosecution occurred.

FACTORIES AND SHOPS ACT

Departmental officers are authorised as inspectors under this Act, to supervise safety measures within the dairy industry. All necessary steps were taken during the year to ensure conformity with these Regulations. This work is done in conjunction with normal duties and does not necessitate special visits.

Herd Production Improvement Scheme

Herd Recording.—During the year 64 Herd Recorders were employed, and some 45,000 cows were recorded under the Group Herd Recording Scheme.

The figures are less than those of previous years, due to the new method adopted in counting the cows under record. This method only includes those cows which have completed a lactation record during the year of from 1-10 months, plus part-lactation cows (i.e., cows entered more than 60 days after calving, and recorded for the owner's information only).

An extension to 70 units, plus five relief Herd Recorders, during the year 1959-60, will absorb our existing establishment for Herd Recorders. That development will also absorb the full share of the Dairy Industry Extension Grant allotted for herd recording.

Under the *Official Scheme*, 7,149 cows were recorded, an increase of 332 on the previous year's figures.

The following are inter-year comparative figures regarding the *Group Herd Recording Scheme*:—

Outstanding production performances enabled individual animals to secure a number of awards in the section Type and Production Classes. Wagga Agricultural College and Experiment Station was awarded six trophies in the Jersey Herd Society's Lactation Competition.

Development of Polled Jerseys.—The Department has for a number of years been conducting a breeding programme in an endeavour to develop a herd of polled Jerseys. This work had been carried out at the New England Experiment Farm but during the year the activities were transferred to Grafton Experiment Farm when 23 head of polled animals were transferred.

Having secured the polled factor it is now proposed to develop the Herd along the lines of improved type and production.

Extension Services

Dairy Science Schools.—Six Dairy Science Schools were conducted for the tuition and examination of factory operatives for certificates of competency in milk and cream testing and cream grading. Eighty-three operatives attended the Schools.

School of Instruction for Factory Operatives.—A School of Instruction for factory operatives was conducted at Lismore by Dairy Officers of the Lismore Dairying District. Subjects included the theory and practice of milk and cream testing, and milk and cream grading. The lectures occupied twenty-five nights. Twenty-two candidates attended these lectures.

Addresses by Dairy Officers.—Addresses were given by Dairy Officers at Dairy Farmer Refresher Courses, field days, film evenings, Agricultural Bureau meetings, Junior Farmer Club meetings and other rural gatherings.

Dairy Farm Improvement Competition.—Sixty-three entries were received for this competition. District judging was conducted by District Dairy Officers. The winners in each district were then judged by specialist officers from Head Office. This competition is sponsored by the Country Life Newspaper.

Production Improvement Project.—This Project has practically ceased to exist, due to concentration on other forms of extension. However, thirteen farmers co-operated in the Project during the year.

Milking Machine Efficiency Survey.—The survey of milking machine efficiency has continued; 606 visits were made by two officers. A third officer operated for three months.

This survey has been particularly well received by farmers. It has definitely brought results; summarised as follows—under the headings "Faults of Installation", "Faults in Maintenance and Education", and "Faults due to Poor Equipment":—

(a) Faults of Installation—

Gauges: 17 per cent. of gauges incorrectly placed or not in use, with 14 per cent. so inaccurate as to make them strongly suspected of causing mastitis.

Pulsators: 18 per cent. with unsatisfactory staggering.

Milk Line Slope: 12 per cent. incorrectly installed, indicating need for a better standard of installation.

General Installation: Of 674 machines graded in all districts, some 190, or 28 per cent. were classed as having some fault in installation; while 78, or 11 per cent. must be classed as "fair only" to "poor" in installation.

(b) Faults in Maintenance and Education—

Sight Glasses: Of the 9 per cent. unsatisfactory in type and condition, 46 per cent. were the Jellyjar type as against 7 per cent. of the Ruakura type.

Maintenance of Pulsators: 45 per cent. were shown as from "fair" to "badly maintained"; indicating the need for a more intense education of the farmer at the time of installation and during follow-up service visits.

Tinning: This could logically be classified under a heading of "Maintenance, Education and Poor Equipment"; 24 per cent. of machines were classified as "good in all respects", as regards tinning, but 76 per cent. showed faults in some or other respects; 33 per cent. of the machines were classed as "all poor", while 20 per cent. were "poor with the exception of claws, down droppers, etc.". The survey indicated that milk lines in general were in better condition than down droppers, claws and releasers; indicating the strong need for better tinning or better metals and standards for these items, using other materials than tinned-brass. Already these items are in the way of being corrected by the increase in the use of stainless steel and pyrex glass and so on, and it appears only a matter of time before the use of tinned-brass and metals subjected to quick erosion will be a thing of the past.

(c) Faults due to Poor Equipment—

Vacuum Regulators: The Survey indicated strongly the need for improved standard of vacuum regulators. Using the Ruakura vacuum regulator as a standard we find that, even in this improved type, 15 per cent. are unsatisfactory; with another weighted type, in general use, showing 34 per cent. as unsatisfactory; and all other types showed practically 60 per cent. as unsatisfactory.

It is obvious and cannot be too strongly emphasised that a relief valve of a weighted type should be used. If all types other than the two main weighted relief valves in use were dispensed with, a marked improvement in efficiency must result.

Inflations: The straight inflations, of recognised short life, form only 17 per cent. of the total; 83 per cent. being made up of moulded or semi-moulded types. It was disturbing to find that 75 per cent. of the rubber used has a life of twelve weeks or less. With white, grey or red rubber forming 73 per cent. of the rubber in use, it is reasonable to assume that this type of rubber is unsatisfactory. This is recognised by some firms. They have changed over completely to black rubber. This gives much better service.

Unfortunately, our survey does not at this stage relate the life of rubber to colour nor to the quality of maintenance of machines.

A standard, for rubber that would last at least one season, say twelve months, is needed. This would be in the interests of the farmer. He faces an economic

drawback in frequent replacement of rubberware. This undoubtedly leads him to use the rubber beyond its life of sanitary usefulness.

Testing of Air Flow Meters.—The Testing Station established at Hawkesbury Agricultural College, to test Ruakura Air Flow Meters, has functioned satisfactorily. The number of meters submitted for testing has been small but will increase.

General Extension Services; Statistics of Farm Visits.—Some 1,909 farms were visited by Dairy Officers for general extension work. In addition, 349 visits were made in connection with Dairy Industry Grant demonstrations, and 550 for herd improvement instruction.

Dairy Officers travelled by car 173,000 miles in the course of the year's work.

General Extension Services; Statistics of Group Activities.—Dairy Officers attended 110 field days, 57 film evenings, 30 meetings of Agricultural Bureaux, and 44 Agricultural Shows, for extension purposes.

Agricultural Society Shows.—Dairy Officers attended 44 Agricultural Society Shows throughout the State, including the Royal Agricultural Society Show and acted as Judges and Stewards in the Dairy Cattle and Dairy Produce Sections.

Dairy Industry Extension Grant

The 1958-59 allocation to New South Wales under the Commonwealth Dairy Industry Extension Grant continued to be used for promotion of improved practices in the dairy-industry, and was expended on:—

- Grade Herd Recording,
- Farm Demonstrations of Improved Pastures and Silage Making,
- Milking Machine Efficiency Survey,
- Testing Station (Air Flow Meters),
- Punch Card Equipment,
- Publicity,
- Agricultural Trainees,
- Salaries of Organising Officers, and
- Salaries of Staff engaged in Statistical Work.

Success of Silage Demonstrations.—In the Maitland, Taree, Kempsey, Tamworth and Nowra districts these demonstrations have given a great impetus to the conservation of fodder in this form for dairy stock. It is estimated that an additional 40,000 to 50,000 tons of silage has been made in the Hunter Valley district alone.

Field days in association with the Grant projects totalled 54.

General

School of Dairy Technology at Hawkesbury Agricultural College.—It is with deep regret recorded, that Principal Dairy Officer Mr. E. H. Headley passed away on 24th February, 1959, after a long illness. His services to this Division and Industry were outstanding.

On 13th April, 1959, Mr. D. W. Crowfoot was appointed Principal Dairy Officer in charge at the School of Dairy Technology.

Special Dairy Officer (Products other than Butter).—This position, vacant for more than half of the year, has now been filled by Mr. C. E. Chapman who was Senior Dairy Officer at Wagga Wagga.

Overseas Study by Dairy Research Officer.—Mr. G. J. Smith is still in the U.S.A. continuing his studies.

Interstate Visits.—The Principal Dairy Officer (Herd Improvement) accompanied by Dairy Cattle Officers visited Queensland and Victoria to attend the Brisbane and Melbourne Royal Shows for liaison with breeders and Departmental officers.

A Dairy Officer instructing students in cheesemaking at Hawkesbury Agricultural College attended the Cheesemakers' Conference in Brisbane as this Department's representative. The conference was the third of a series organised by the Cheese Manufacturers of Australia and the Australian Society of Dairy Technology. The officer also visited various Queensland factories and gained valuable information.

Extraneous Matter in Dairy Products.—Under Export Regulations, filtration of all milk or cream used in the manufacture of export dairy produce is compulsory. This has

necessitated installation of filters in factories in this State. Dairy Officers have co-operated with Department of Primary Industry in implementing the installations.

DIVISION OF ANIMAL INDUSTRY

Veterinary, General

Some of the notable occurrences were the diagnosis of eperythrozoonosis in sheep, the extensive outbreak of infectious virus diarrhoea (previously referred to as "winter dysentery"), the marked increase in the incidence of avian monocytosis, a severe outbreak of swine pox on the north coast, and extensive neonatal loss of lambs.

Veterinary Staff.—Four veterinary trainees graduated and were immediately absorbed. In addition, two other appointments were made, each at the Veterinary Research Station. Resignations included two from the Veterinary Research Station and one from the field staff. Nett gain was therefore three.

Three Pastures Protection Boards veterinary appointments were made, but there were two resignations.

Seasonal Conditions.—The season was somewhat uncertain early, but the dry spell had broken by the spring and, except in the Far Western Division, the position was thereafter generally favourable.

Eleven districts were declared "drought stricken", for purpose of freight concessions on carriage of fodder. Four were in the Western Division and are still declared. All others had been removed from the declaration by the spring, but two districts in the southern tablelands were recently declared.

Diseases Incidence

Eperythrozoonosis in Sheep.—This disease was discovered for the first time in Australia, in Gundagai district. Of 390 three months' old lambs, some 30 per cent. showed anaemia, and about fifty-six died in a month. Post-mortem appearances were mainly those associated with severe anaemia, including degeneration in voluntary muscle groups, as well as in heart muscle. Blood smears examined at the Veterinary Research Station showed the protozoan *Eperythrozoon ovis*. Identity was confirmed by South African authorities, who originally described the condition. The parasite is unlikely to become important except, perhaps, where lambs are under stress conditions.

Infectious Virus Diarrhoea.—This was previously referred to as "winter dysentery". At the close of the previous year, the outbreak had affected only dairy cattle herds in the County of Cumberland, but later it spread up and down the coast, to the Queensland border and the Victorian border; also across the mountains into the central western districts, the southern tablelands, and part of the northern tablelands. It subsided in January, 1959. Since then there has been no confirmed case.

Overseas reports indicate that this disease re-appears severely in affected herds on the advent of cold weather after the summer break. This has not been our experience so far. Field officers are keeping a close watch for the disease.

Investigations into its origin were unsuccessful. Probably it arose from grains imported from overseas when this State's grain harvest failed so completely in 1956-57.

Avian Monocytosis.—This has become the most important disease of poultry in N.S.W. It was reported in all districts, in all months of the year. Mortality in some flocks was upwards of 90 per cent., particularly when complicated by other diseases such as infectious laryngotracheitis and fowl pox.

One of the most severe outbreaks resulted in the loss of over 3,000 chickens aged about three months, though vaccinated for the two latter diseases. Monocytosis broke out and was followed by infectious laryngotracheitis and fowl pox introduced during vaccination.

Indicating the importance of monocytosis, the Director of Veterinary Research has reported 713 of the 5,377 specimens examined at the Station were affected. As this figure includes specimens of eggs as well as poultry, the incidence of monocytosis is higher than the figures indicate.

Cause of the disease has not been determined. Some practitioners with extensive poultry experience believe it is due to a virus infection. Others consider it due to extensive use of antibiotics in the feed. No experimental evidence in support of either contention is available. The question urgently needs solution.

Swine Pox.—An extensive outbreak occurred during the late summer. It apparently commenced in Port Macquarie district and extended northward into Grafton and Casino districts.

Main centre appeared to be Port Macquarie district. There the disease was widespread and affected many herds. It appeared there simultaneously with a very serious plague of mosquitoes.

Spread was assisted by distribution of pigs, either in early stages of the disease or during the incubation period. Undoubtedly the mosquito plague was the main factor in transmission of the disease. No particular remedial measure was instituted, and the disease subsided with the advent of cold weather and suppression of the mosquitoes.

The possibility of producing a vaccine is under investigation. However, there are difficulties in the way of transmitting the disease, and field staff have been asked to submit material which may make transmission easier.

Neonatal Losses in Lambs.—The field veterinary services are increasingly interested in investigating losses in lambs at or about birth. Two further outbreaks of vibriosis were discovered, as were an increasing number of abortions and stillbirths due to *Listeria monocytogenes* infection of the ewe. Investigations show that the greatest improvement will be through animal husbandry. Overall neonatal mortality on selected properties has been reduced from about 15 per cent. to 5 per cent.

Main factors concerned seem to be faulty nutrition and lack of shelter. To obtain further information on the animal husbandry aspects, a survey by the Livestock Officers is planned.

Blowfly Strike.—An extensive wave of blowfly strike occurred during March and April, 1959, and the degree of developed resistance to chlorinated hydrocarbons, reported last year, was confirmed by experimental techniques applied by the Entomological Branch, Division of Science Services. There is further reference to the work, in that section of this Report of the Department.

Failure of Diazinon on occasions to give protection has not yet been explained.

Interest in the Mules operation has revived, but even so the number of sheep mulesed is far too few.

Infertility in Dairy Cattle.—This remains one of the major problems of the dairy industry. Cases investigated during the year were due to brucellosis, trichomoniasis, vibriosis, leptospirosis, vaginitis and functional infertility.

The vaginal mucus agglutination test has been applied at the Veterinary Research Station, Glenfield. It has confirmed previous suspicions that vibriosis is an important factor in dairy herd infertility.

Even so, brucellosis is the major problem. If a complete cover of Strain 19 vaccination could be undertaken in dairy herds, infertility troubles would decrease very significantly.

Trichomoniasis is much more widespread than the number of dealt-with outbreaks might imply. During the year eighteen new outbreaks were discovered involving 1,837 cattle. The disease was eradicated from fourteen properties, and these were released from quarantine.

Most trichomoniasis infections are found in the Grafton and Cumberland Veterinary Districts. A current outbreak involving several herds is under investigation in Port Macquarie district.

Spread of trichomoniasis is assisted by the practices of cross mating or by accidental cross mating or outside mating. Communal dry runs also are conducive to the spread. They in fact explain the number of herds involved in the present outbreak in Port Macquarie district.

Attention has again been drawn by a number of cases of infertility featuring a vaginal discharge within one to three days of mating. The possibility of a virus infection was investigated on two occasions by submission of specimens to the Veterinary Research Station, Glenfield, but a firm diagnosis was not possible. Field evidence suggests a virus condition.

Functional infertility also occurred, during the dry spell over the summer. In some cases copper deficiency seemed significant. Before this could be investigated fully, the seasonal outlook changed. The functional infertility in most cases investigated took the form of quiescent ovaries.

Ovine Brucellosis.—The complement fixation test for ovine brucellosis has now been performed at the Veterinary Research Station, Glenfield. From specimens examined, British breeds

are much more heavily infected with this organism than are Merinos. So far, infection has been demonstrated in very few Merino rams. On the other hand, many Merino rams displayed epididymitis, the cause of which has not been determined.

Practitioners continue to press vaccination as a method of control, but observations on a number of properties suggest that segregation, together with a clinical examination and complement fixation test, is giving excellent control and a positive method of eradication. The same cannot be said of vaccination.

Whether vaccination of sheep should be permitted is still under consideration.

An interesting observation is that infertility and abortion in ewes have not been demonstrated to occur. This is surprising, in view of the New Zealand experience. Perhaps in New South Wales the virulence of the organism is lower.

Enterotoxaemia in Cattle.—An increasing number of cases of mortality in six to nine months old calves is due to enterotoxaemia. The causal organism is *Clostridium perfringens*—type D.

Reason for the increase is not clear. It may be that diagnostic methods are improving, that more people are becoming aware of the disease, or that the higher incidence is due to the increase in pasture improvement.

Control of the condition has not been investigated extensively. It would be very difficult to do so. Most of the investigated mortalities are fleeting and, as no controls are kept, the effect of any vaccination undertaken after the outbreak cannot be determined. Similarly, the effect of prophylactic vaccination, undertaken in a few instances, is difficult to determine.

Tuberculosis.—In the tabulations, the numbers of cattle tested during the year are shown; including the Milk Board Scheme, the T.B.-free Herd Scheme—in Protected Areas and under the Local Government Scheme—and also miscellaneous testing.

The number of cattle tested in the miscellaneous section remained at a high level (160,879) and 5,654 reactors were detected. This figure is interesting. It reveals reduction in incidence of reactors, from 5.4 per cent. in 1957-58 to 3.5 per cent. in 1958-59. Possibly this reflects the effect of testing over the past several years; in particular the tests in the most heavily infected area in the State.

Preparations for introduction of area testing are almost complete. It is hoped that in 1959-60 six areas will be established and the disease logically eradicated.

The human strain of the tubercle bacillus was recovered on five occasions. It is difficult to assess the significance, but typing of the organism was undertaken only in that number of cases.

That the highest incidence of T.B. occurs in dairy cattle was again demonstrated. This was well-known. Even so, an incidence of almost 50 per cent. in one herd of beef cattle was found in the area of the District Veterinary Officer, Cootamundra. Several instances where infection reached some 25 per cent. in beef cattle herds were discovered.

Application of the tuberculin test to cattle herds following the detection of tuberculosis in them, undertaken under the regulations gazetted during 1957-58, has been continued. This is emphasised by the maintenance of the high rate of testing shown in the figures for miscellaneous testing (page 59).

Pleuro-pneumonia.—There was no outbreak of pleuro-pneumonia; one of the few years in which N.S.W. has remained free of this disease.

Cobalt Deficiency.—Field evidence that cobalt deficiency occurs on the southern tablelands and slopes is accumulating. The evidence is not satisfactorily scientific but many owners there have derived considerable benefit from inclusion of cobalt in licks for cattle and sheep.

The District Veterinary Officer, Cootamundra, is endeavouring to demonstrate that cobalt deficiency does occur; by a series of field trials in comparable groups of treated and untreated sheep. The answer may emerge next spring.

Conditions during Export of Sheep to America.—An interesting trial shipment of 28,000 lambs to America occurred. Final details of the mortality rate were not available at the close of the period under review.

In the holding yard prior to shipment, mineral imbalance and salmonellosis were responsible for most of the sickness and mortality. In the holding yards the feeding and water arrangements were not satisfactory and in no small measure accounted for the appearance of these diseases.

Some Statistics of Diseases Incidence

1958-1959

Anthrax

No. of Sheep	No. of Deaths	No. of Cattle	No. of Deaths
9,976	87	137	2

External Parasites—Sheep

	1958-1959	1957-1958
At Flemington—		
No. Inspected	2,188,417	2,241,732
No. of Pens	32,601	31,003
No. Infested	6,580	4,992
No. of Pens	137	130
At Maitland—		
No. Inspected	150,350	*
No. of Pens	2,542	..
No. Infested	570	..
At Waratah—		
†No. Inspected	108,500	..
‡No. of Pens	2,156	..
No. Infested	376	..
Elsewhere in State—		
No. Infested	688,799	677,092
No. of Properties	866	679

* No records kept.

† Figures for 1st August, 1958, to 30th June, 1959.

‡ Figures for 1st October, 1958, to 30th June, 1959.

T.B.—Milk Board Scheme

Area	No. Cattle Tested	No. of Reactors
Metropolitan	7,564	27
Blue Mountains	332	..
Wollongong	427	2
Southern	1,519	6
Hunter District	1,520	1
Newcastle	661	2
Erina	399	..
Port Stephens	133	2
Upper Hunter	86	..
	12,641	40
	Incidence : 0.32 per cent.	

T.B.-free Herd Scheme

Studs			Non-Studs		
No. of Herds	No. of Cattle	No. of Reactors	No. of Herds	No. of Cattle	No. of Reactors
38	4,618	7	64	4,760	9

T.B. Protected Areas

No. of Areas	No. of Cattle	No. of Reactors
15	3,415	..

Local Government Scheme

No. of Areas	No. of Cattle	No. of Reactors
24	13,045	100

T.B. Miscellaneous Testing

Cattle Tested	No. of Reactors	Incidence
160,879	5,654	per cent. 3.5

Brucellosis-Free Herd Schemes

Cattle			Swine		
No. of Herds	No. of Cattle	No. of Reactors	No. of Herds	No. of Swine	No. of Reactors
10	Studs 1,689	28	17	Studs 510	5
6	Non-Studs 482	4	1	Non-Studs 12	..

Brucellosis—Miscellaneous Testing

Cattle		Pigs	
No. Tested	No. of Reactors	No. Tested	No. of Reactors
7,395	1,017	1	..

Trichomoniasis

No. of Outbreaks	No. of Cattle	No. of Properties Released
18	1,837	14

Avian Tuberculosis

No. of Outbreaks	No. of Properties Released	Districts
10	8	Albury Forbes Moss Vale Moulamein Orange Tamworth Wagga

Pullorum-Tested Flock Scheme

	No. of Flocks Tested	No. of Birds Tested
Class 1	20	59,887
Class 2	19	64,856
Class 3	35	69,010
	74	193,753

Regulatory Services

CATTLE COMPENSATION ACT

Increased Claims.—Some 9,733 claims were dealt with, involving 17,923 animals. Total of compensations paid was £293,481. By comparison with 1957-58, the claims increased by 1,492, the number of animals by 906, and the payments by £1,367.

Higher Residual Values.—The residual values received, particularly over the last three months, have been greater—by comparison with past years—for two reasons, namely:—(a) increased market value of cattle in general has increased the value of suspect beasts; and (b) more suspects have been sent to abattoirs for disposal—with a resulting residual value; instead of being slaughtered on the property—with no residual value.

Had this increase in residual value not occurred the difference between payments this year and last year would have been much greater because of the increased number of claims this year.

Payment Percentages, per Disease.—Of the payments this year, 74.8 per cent. were for tuberculosis; 12.6 per cent. for cancer; 9.5 per cent. for actinomycosis, and the balance for the other scheduled diseases.

Cancelled Claims.—In addition, 182 claims received were cancelled. Of these, 153 cancellations were for various reasons, mostly for late notification of disease; 15 because they were duplicates; and in the case of nine the net compensation was "nil". Five claims were at first cancelled but later were reviewed and paid.

Extension of Claim Period.—During the year the period in which claims must be lodged was extended by Ministerial direction from 30 to 60 days. This extension reduced the number of late claims dealt with.

SWINE COMPENSATION ACT

Swine registers maintained by butchers were regularly inspected. Improvement in inspections continued; a result of employment of rangers by the Pastures Protection Boards.

STOCK FOODS AND MEDICINE ACT

Applications for Registration of Stock Medicines.—Of the 1,776 applications for the registration of stock medicines, 1,650 were granted registration. Of the remainder—44 were withdrawn, 5 were refused, and 77 were still under consideration at the end of the year.

Investigation of Applicants' Claims.—Due to discovery of the growth promoting properties of certain hormones, and the receipt of applications for registration, investigational work was done for the Board, to ascertain the correctness of claims by applicants.

Other more important problems that faced the Board included such as (a) indiscriminate use of antibiotic drugs by the public, and the relationship to increased bacterial resistance; (b) use of Diazinon and Malathion against sheep blowflies resistant to Dieldrin and Aldrin; (c) refusal of registration for Mastitis Vaccines, in the light of present knowledge; (d) registration of medicines as "Blood Tonics" only when such medicines contain haematopoietic constituents; and (e) insertion of inaccurate or excessive claims in advertising matter by drug companies.

Applications for Registration of Stock Foods.—Some 1,349 applications were finalised. Various applications from fifty firms were still being considered at the close of the year.

The detailed check of applications, by a veterinary officer, continued; and the position is better than it has been in many years. Liaison with the manufacturers continued, to the benefit of all concerned.

More Reliable Labelling.—Information contained on labels now conforms with requirements of the Act to a greater degree than previously. However, some labels still need correction.

Few samples were analysed this year due to the inability of the Chemists Branch to handle this additional work.

Advice to Manufacturers.—A comprehensive circular was drawn up and forwarded to all stock food manufacturers, to help them when applying for registrations during the next registration year. At the same time they were advised that two labels would be required; so that after registration one



"Picnic Lunch from Tel-Aviv"

Plant quarantine and animal quarantine services fulfilled by Division of Horticulture and Division of Animal Industry at sea-board and air ports constantly reveal prohibited plant and animal products—potential carriers of certain diseases from which this country is free—concealed in passengers' luggage. The inspections are but one of the crucial services by the Department of Agriculture to farm and pastoral industries.

(Photo.—Division of Animal Industry)

label, marked "approved", could be returned with the certificate of registration. This should assist manufacturers when drafting new labels for their products.

COMMONWEALTH QUARANTINE ACT

Importations of Animals Low.—Total importations of animals into N.S.W. from overseas was the lowest for many years; mainly the result of the prohibition, which came into effect last year, on importation of ruminant animals because of the worsening world disease position—particularly in the case of Blue Tongue.

The only importations of domestic animals were of dogs, cats, and horses; from Great Britain, Northern Ireland, Republic of Ireland, and New Zealand.

In addition, consignments of zoological animals, fishes, queen bees, and animals for scientific purposes, were imported from various countries.

Birds may only be imported from New Zealand. The number imported this year was a little above average.

Animal Products.—The types of animal products introduced as regular importations remained similar to previous years. There was, however, a decided increase in the quantity imported; particularly manufactured cheese, hides, skins and wool.

Attempted Importation of Prohibited Products.—Salami, other meats, and cheese continued to be brought by European migrants in their baggage. Large quantities of these items were seized and destroyed.

Eggs, egg products, and meats from the East, brought in by Asians, were seized.

These irregular importations constitute a grave risk of disease introduction. Some migrants now conceal this type of product in secret compartments within tins of olive oil, in attempts to deceive the authorities. One Italian migrant was prosecuted by the Commonwealth and fined, for interfering with the examination of luggage by officers of the Customs Department and Animal Quarantine Service.

Pets on Overseas Ships.—Strict supervision was maintained over pets on overseas ships. A number of animals had to be destroyed; the respective ship Master having refused to sign the appropriate bond.

Ships' Galley Refuse.—The matter of disposal of ships' galley refuse was kept under attention; even though the relevant Quarantine Regulations were revoked during May, 1958. The problem is of great importance to the protection of the livestock industries against the incursion of exotic disease.

Disposal at Newcastle was found to be highly unsatisfactory.

MEAT INSPECTION SERVICE

Staff.—At 30th June, 1959, the staff of the Meat Inspection Service comprised the Principal Veterinary Officer, Assistant Principal Veterinary Officer, one Veterinary Officer, one clerical assistant, 133 Meat Inspectors and 13 Brand Boys. The services of three Meat Inspectors, one clerical assistant and four Brand Boys were lost through resignations or retirement; and two Brand Boys were appointed as Junior Meat Inspectors. New appointments comprised sixteen Meat Inspectors and six Brand Boys.

The establishment of Meat Inspectors remained at 133; one new position having been created, at Dubbo Municipal Abattoir, and one position having been deleted, at W. Angliss & Co. Pty. Ltd. Abattoir, Daroobalgie, where stock were no longer slaughtered for consignment to the Metropolitan Abattoir Area.

METROPOLITAN INSPECTIONS

State Abattoirs, Homebush Bay.—The number of cattle and sheep slaughtered and inspected substantially increased, but calf and pig slaughterings decreased. Details of stock inspected at the State abattoir, not including export are:—

	Cattle	Calves	Pigs	Sheep
1957-58	207,401	147,338	119,211	2,289,489
1958-59	236,678	131,451	92,520	2,704,493

Ante-mortem Inspection.—All cattle slaughtered at the State abattoir were inspected by a senior Meat Inspector on entering the lairages where they were held prior to slaughter. At this inspection, all cattle marked as suspect at Flemington saleyards, and suspect diseased cattle consigned direct to the abattoir, were identified and recorded. In addition, 294 head

of cattle were detected showing some abnormality or disease warranting a special post-mortem examination, and not previously marked as suspects.

A Veterinary Officer or senior Meat Inspector inspected all pigs before slaughter. Those diseased and unfit for slaughter for human consumption were slaughtered separately; and the carcasses were consigned to the by-products department.

Emergency Slaughter Inspections.—Over the year, 1,200 cattle which could not be brought to the killing floor were slaughtered at Flemington Saleyards and holding yards at Homebush Bay. They were dressed in a separate annex at the State Abattoir, and were subject of a special post-mortem examination.

Meat Market Inspections, Homebush Bay.—Three Meat Inspectors at the Homebush Bay Meat Market engaged in re-inspection of meat entering the Metropolitan Abattoir Area; and also checked meat slaughtered at Homebush Bay and sold through the Meat Market.

A check was also maintained over cleanliness and construction of vehicles used for carriage of meat from the Meat Market, and the hygiene of meat-handling in the market.

Details of meat passing through the Meat Market, Homebush Bay, other than that slaughtered at Homebush Bay, are as follow:—Beef, 160,103½ bodies; veal, 205,497½ carcasses; pork, 216,407½ carcasses; mutton and lamb, 493,546½ carcasses; boneless meat, 789,373 lb.; sundries, 3,353,731 lb.

Metropolitan M.I.B. Saleyards Inspections, Flemington.—All cattle sold through the Flemington saleyards were inspected by a senior Meat Inspector. Any cattle suspected of disease or requiring a special post-mortem examination were recorded and identified, and forwarded direct to the State Abattoir for immediate slaughter.

Some 257,646 cattle were inspected at Flemington Saleyards; 1,532 were consigned to the saleyards on “orders for movement” as positive reactors to the Tuberculosis test, and 491 as suspect for other diseases.

Also, 878 cattle not consigned to the saleyards on “orders for movement” were marked as suspect of being diseased or otherwise unfit for human consumption.

Private Saleyards Inspections.—At private saleyards within the metropolitan area 3,147 cattle, 2,569 calves, and 1,587 pigs were inspected prior to sale.

Knackery Inspections.—At two knackeries in the metropolitan area the slaughter of horses and cattle for animal consumption, and the spraying of carcasses with methylene blue, were supervised by Meat Inspectors on behalf of the Department of Public Health. Details of slaughterings at these premises are as follow:—

	Horses	Cattle
1957-58	13,903	163
1958-59	18,016	11

Introduction of Meat into the Metropolitan Abattoir Area.—A staff of seven Meat Inspectors located in the city area and two Meat Inspectors at the Meat Market, Homebush Bay, engaged primarily in the re-inspection of meat entering the Metropolitan Abattoir Area. Some re-inspection was also undertaken at the Riverstone Meat Co. abattoir, Riverstone, and at depots in the outer metropolitan area.

Details of meat introduced into the Metropolitan Abattoir Area, and condemnations made on the re-inspection of meat introduced, are respectively shown in the following two tabulations. Condemnations on re-inspection were generally due to putrefaction or contamination.

Meat Introduced Into the M.A.A.

Type of Meat	Origin		Total
	New South Wales	Outside New South Wales	
Beef carcasses	378,828	35,070	413,898
Beef piecemeats	5,067,286 lb.	2,695,944 lb.	7,763,230 lb.
Veal carcasses	310,151	60,510	370,661
Veal piecemeats	179,782 lb.	487,698 lb.	667,480 lb.
Pork carcasses	266,593	45,506	312,099
Pork piecemeats	818,490 lb.	3,899,627 lb.	4,718,117 lb.
Bacon sides	14,841	4,215	19,056
Bacon piecemeats	1,944,344 lb.	3,328,804 lb.	5,273,148 lb.
Mutton carcasses	1,121,409	155	1,121,564
Mutton piecemeats	735,930 lb.	444,557 lb.	1,180,487 lb.
Goat carcasses	6,734	..	6,734
Goat piecemeats	100,212 lb.	6,869 lb.	107,081 lb.
Sundries	7,833,857 lb.	291,524 lb.	8,125,381 lb.

Meat Condemned on Re-Inspection

Beef	Veal	Pork and Bacon	Mutton and Lamb	Sundries
12 quarters	18 carcasses	4 carcasses	45 carcasses	12,205 smallgoods.
10 butts	5 legs	1 hindquarter ..	61 forequarters ..	36,375 rabbits.
2 cheeks		29 shoulders	330 lb. legs .....	.....
2 rumps and loins		385 hams	2,532 lb. boneless ..	.....
1 rump		42 middles	1,340 lb. livers .....	.....
4,412 lb. beef		4 flitches	950 lb. tongues .....	.....
480 lb. tails		21,150 lb. bacon	5,150 lb. brains .....	.....
113 lb. cheeks		269 lb. ham .....	.....	.....
4,500 lb. livers				
450 lb. kidneys				

Shop Inspections.—Meat Inspectors stationed within the Metropolitan Abattoir Area inspected 1,837 retail butcher shops as a check against sale of meat not branded as required under the Meat Industry Act.

Prosecutions under Meat Industry Act.—Three persons were successfully prosecuted for using vehicles which were not clean and not suitably constructed for carriage of meat from the Meat Market, Homebush Bay.

Prosecutions under Cattle Slaughtering and Diseased Animals and Meat Act.—Six persons were successfully prosecuted for moistening portions of carcasses to enable them to be marked with an indelible pencil at the Meat Market, Homebush Bay.

MEAT INSPECTIONS—COUNTRY ABATTOIRS

State meat inspectors inspected at fifteen abattoirs and three bacon factories of the thirty-five premises licensed or deemed to be licensed under the Meat Industry Act for slaughter of meat for consignment to the Metropolitan Abattoir Area. Meat inspectors of the Commonwealth Department of Primary Industry inspected meat for entry into the Metropolitan Area at three abattoirs. At six abattoirs and five slaughteryards and bacon factories meat inspectors employed by local gov-

ernment are authorised to inspect meat for Sydney. At three abattoirs licensed or deemed to be licensed under the Meat Industry Act, no slaughtering were done for Sydney trade.

Details of stock inspected by State Meat Inspectors at country abattoirs, excluding export, are:—

		Cattle	Calves	Pigs	Sheep
1957-58	.....	329,014	369,080	328,658	696,679
1958-59	.....	410,577	324,808	330,628	799,653

TOTALS OF STOCK INSPECTED

The numbers of stock inspected by State Meat Inspectors at the various slaughtering establishments licensed to kill for the Sydney Metropolitan Area are shown in the next tabulation:—

Place of slaughter	Type of Stock			
	Cattle	Calves	Pigs	Sheep
State Abattoir	236,678	131,451	92,520	2,704,493
Licensed works within Metropolitan Area	60,841	5,816	12,196	1,070,997
Licensed works in Country Areas	410,577	324,808	330,628	799,653
Totals	708,096	462,075	435,344	4,575,143

Conditions Responsible for Condemnations.—The next two tables list the conditions for which carcasses and portions of carcasses were condemned as unfit for human consumption. (Details of offal condemnation are not included, as all such condemnations cannot be accurately recorded.)

Carcass Condemnation Conditions

Disease	Cattle		Calves		Pigs		Sheep	
	No.	Per cent. of kill	No.	Per cent. of kill	No.	Per cent. of kill	No.	Per cent. of kill
Actinomycosis and Actinobacillosis	10	·001	..	..	1,005	·231	1,395	·030
Arthritis	16	·002	27	·006	..	..	2,136	·047
C.L.A.	..	..	..	..	..	..	171	·004
Cyst. Ovis.	..	..	..	..	..	..	9,892	·216
Emaciation	550	·078	34	·007	52	·012	412	·009
Sarcosporidiosis	..	..	..	..	2	·0004	350	·008
Septic Conditions	477	·067	172	·037	2,263	·520	..	..
Tuberculosis	3,971	·561	102	·022	907	·208	..	..
Other Conditions	900	·127	1,289	·279	553	·127	4,182	·091
Total	5,924	·837	1,624	·351	4,782	1·908	18,538	·405

Partial Condemnations

Disease	Cattle		Calves		Pigs		Sheep	
	No.	Per cent. of kill	No.	Per cent. of kill	No.	Per cent. of kill	No.	Per cent. of kill
Actinomycosis and Actinobacillosis	13,032	1·840	7	·002	..	..	3,971	·087
Arthritis	681	·096	6	·001	2,493	·573	11,119	·243
C.L.A.	..	..	..	..	..	..	230	·005
Septic Conditions	277	·039	18	·004	815	·187	..	..
Tuberculosis	3,531	·499	10	·002	4,683	1·076	..	..
Other Conditions	3,257	·460	37	·008	12,094	2·778	4,235	·093
Total	20,778	2·934	78	·017	20,085	4·614	19,555	·427

Suspect Cattle.—The number of cattle (not including positive reactors to the Tuberculosis test) subject to a special post-mortem examination at the State Abattoir, as suspected of disease, were: Consigned to Flemington saleyards, 491; consigned direct to State Abattoir, 253; detected on ante-mortem inspection at Flemington saleyards, 878; and at State Abattoir, 294; total, 1,916.

Post-mortem Findings on Suspect Cattle

Disease	Consigned as Suspect	Detected Ante Mortem	Total
Tuberculosis	10	14	24
Actinomycosis	254	262	516
Actinobacillosis	196	413	609
Cancer	144	144	288
Abcess	75	189	264
Injury	15	71	86
Miscellaneous	40	54	94
N.V.L.	10	25	35
Total	744	1,172	1,916

Tuberculosis.—The number of pig carcasses condemned on account of tuberculosis further declined from 0.44 per cent. in 1957-58 to 0.21 per cent. in 1958-59. The number of cattle condemned on account of tuberculosis was also significantly lower. Condemnations of cattle and pigs for tuberculosis over the past six years are as follows:—

T.B. Condemnations, Cattle and Pigs (Six Years' Figures)

Year	Number Condemned	Per cent. of kill	Number Condemned	Per cent. of kill
1953-54	4,841	0.87	2,387	0.64
1954-55	5,000	0.87	2,714	0.58
1955-56	4,099	0.72	2,302	0.52
1956-57	4,310	0.77	1,775	0.44
1957-58	4,916	0.81	1,459	0.32
1958-59	3,971	0.56	907	0.21

Tuberculosis Reactors.—The number of positive reacting cattle to the tuberculosis test, slaughtered at Homebush Bay, and the location of T.B. lesions found on post-mortem are as follows:—

T.B. Reactors, and Sites of Lesions

Site of Lesion	Number of Reactor Cattle	Per cent. of Total Reactors
Head	177	12
Lung	281	18
Intestinal tract	300	20
Carcass lymph nodes	24	1
More than one site	305	21
Totally condemned	238	15
N.V.L.	207	13
Reactors slaughtered	1,532	100

Board of Tick Control

Staff.—The field staff of the Board numbered 732 at the commencement of the financial year, and reached the peak of 740 about the middle of the year when the new gates at Tweed Heads came into operation. By refraining from filling vacancies except where critically essential the number of field staff was gradually reduced, and numbered 730 at the end of the financial year.

Financial.—The financial year would be completed with a substantial unexpended balance; due to various factors, including reduction in cost of DDT (by about 25 per cent.) and the fact that only a limited amount of the allowed-for fencing on the Queensland Border was completed.

Eradication Campaign—Continuation of Eradication, Areas West of Richmond Range.—Eradication measures were continued in the Rivertree, Bookookoorara, and part of Cheviot and Cullendore Areas. Surveillance inspections were continued and no infestation was detected. As a result, those areas were released from quarantine.

In the Cheviot North Area, a single tick infestation had been detected on a property in February, 1958. This property and all the adjoining holdings were again put under eradication measures. The properties were leased and emptied of stock. They will be free of stock until fifteen months have elapsed (from 1st September, 1958).

In Southern Tabulam two single tick infestations had been detected on two properties in February, 1958. A decision was made that a policy of eradication should be continued in the

area, and treatments were completed by June, 1959. No further infestation was detected until June, 1959, when multiple infestations were detected on two adjoining holdings. Either the infested stock were introduced on to the holding from some other area, and this could only apply to one of the properties involved, or the holdings were infested prior to the eradication campaign in 1956-57 and carried an undetected light infestation through the treatments and inspection period. Both holdings had been frequently examined during 1958-59 without evidence of ticks.

On detection of the infestations on these two holdings, arrangements were made for stock to undergo treatments as for eradication, pending review of the position in respect of Southern Tabulam as a whole.

During October, 1958, action was taken to separate the western section of Woodenbong Quarantine Area from the remainder, as no tick had been detected in that part of the Area subsequent to the eradication campaign. The separated area was gazetted as *Legume Quarantine Area*. Necessary gates were installed and boundaries were placed in stockproof condition. A policy of twenty-one day examinations was introduced and continued until the end of June, 1959. Some 77,005 stock were examined, and no evidence of cattle tick was detected. After a further period of examination it may be possible to release this area from quarantine.

The fifteen months dipping programme within Boonoo Boonoo Area was completed on the 31st August, 1958. After completion of the dipping period the Boonoo Boonoo Area

underwent a period of examinations at 21-day intervals, ending on 31st June, 1959. Some 93,586 head were examined and no evidence of cattle tick was detected.

Examinations in Copmanhurst and Grafton Areas.—In view of detection of a single tick infestation at Coombadiha in March, 1958, a period of examinations throughout the Copmanhurst Area was undertaken to determine the status of the rest of the area. On 1st December, 1958, examinations at 21-day intervals commenced. Up to the end of June, 1959, some 497,785 cattle were examined.

Four infestations were detected during the 3rd round of inspections. The first three were in the Coaldale-Punchbowl Area—single ticks in two cases and two ticks in the third case. The fourth infestation was detected on a holding west of Copmanhurst. The location of the holdings, and other problems, made impossible the establishment of a special quarantine area; but each holding was treated as an infested holding, and restrictions were imposed on movement of stock from the infested and adjoining holdings.

During February, 1959, two further infestations were detected—north of Fine Flower. They were multiple infestations involving several head of cattle in various paddocks. To this date all infestations had been east of the Clarence River; and, therefore, as a precautionary measure, restrictions were imposed on movement of stock from east to west of the river.

Towards the end of April, 1959, a further infestation was detected on a large property in the southern part of Copmanhurst Area, west of the Clarence River.

By the end of June, 1959, it was obvious that the whole of Copmanhurst Area must be regarded as infested; and the placing of the Area under a policy of control was under consideration.

The 1957-58 report mentioned infestations detected in Southgate and Clarenza Sections of the Grafton Quarantine Area. Special restrictions were imposed on the movement of stock from these Sections.

Subsequently the policy adopted in the Grafton Area included examination of all moving stock, and treatment and examination of all stock within the Special Quarantine Areas. During 1958-59 three further infestations were detected in Grafton Area but in each case the infestation was on a property within the Special Quarantine Area. In two cases they were on properties previously found infested.

Every opportunity has been taken to examine stock within the Area but no further pocket of infestation could be detected.

The Special Quarantine Areas were fairly maintained during the year, but some uncontrolled movements occurred during floods in January and February, 1959. In every case where the cattle could be traced, subsequent examinations were made; but no evidence of tick infestations was detected.

Detection of Ticks in Clean Country.—Rivertree Quarantine Area was released from quarantine on 31st December, 1958. At the end of May, 1959, during examination of stock on a property in clean country adjoining the Bonalbo Quarantine Area boundary, a multiple infestation was detected.

Immediate steps were taken to examine stock on all the adjoining properties in clean country and one further infestation was detected in the same month. Subsequently five other holdings south of the Clarence River, in the vicinity of Pretty Gully, were found infested. It appeared certain that they had been present for a considerable time. Investigations have not revealed the source.

Immediately these infestations were detected, action was taken to regazette the whole of the Rivertree Quarantine Area, to re-establish gates where necessary, and to reinstitute patrols of the boundaries of the Area. Owing to lateness of the season it was not possible to undertake more than one examination of the stock within the remainder of the Rivertree Area. This failed to reveal the presence of any further infestations. Further intensive examinations will be necessary throughout the Area, to determine whether there has been any spread from the known infested locality.

Detection of Arsenic Resistant Ticks.—Additional properties within the Tweed and Richmond Quarantine Areas have come under notice for the fact that arsenical treatments appeared to be inadequate.

Investigations by Veterinary Officers and other staff confirmed the suspicion of arsenic resistance in many cases, and, where necessary, additional dips were charged with DDT.

Outbreaks of Tick Fever.—In July, 1958, a mortality on a holding at Larnook was confirmed as a case of tick fever. There had been straying of stock onto the adjoining holding, where tick fever was subsequently confirmed. *Babesiella argentinum* was identified in the material from these two outbreaks. Source of infection was not determined.

Six animals were affected on the one property, and three died; on the other property 11 animals suspected were consigned for slaughter.

Arsenic resistant ticks were confirmed on one holding, and the necessary dip was then charged with DDT. The usual policy was implemented, and mortalities ceased as soon as the initial treatments were carried out.

At the end of January, 1959, near Casino, the death of a bull on a small dairy was confirmed as due to tick fever. *Babesiella argentinum* was identified in the smears. One more animal developed symptoms and was consigned to the meat works. Source of infection was not determined.

In February, 1959, a mortality was investigated on a holding at Piggabeen with a long history of outbreaks of tick fever. It was last released from quarantine in January, 1956. This time the mortality amounted to seven head. Five animals were consigned for slaughter on suspicion. *Babesiella argentinum* was the parasite involved.

In March, 1959, an adjoining holding which had previously been infected, and released from quarantine in June, 1958, was involved. *Babesiella argentinum* was the organism responsible. Four deaths occurred before control measures were instituted.

Each of these Piggabeen holdings adjoins the Queensland border. This is the probable reason for their recurring outbreaks of tick fever.

On one of them, owing to the number of animals affected, arrangements were made for DDT treatments at seven-day intervals. The mortalities were controlled soon after treatments commenced.

Early in June, 1959, two adjoining holdings in the Rosebank locality were involved. Smears confirmed *Babesiella argentinum*. Control measures were instituted and mortalities ceased. In one case three deaths had occurred, and, in the other, six deaths. Source of infection could not be determined; but there had been an outbreak in this locality in 1956-57.

Investigations.—Research and allied investigational activities have been reported (page 66) under "Research—Tick Board Laboratory".

CONTROL POLICIES

Control Policies—East and West of the Range.—In the Tweed and Kyogle Quarantine Area, a full control policy was maintained, requiring all dry stock to be treated at 28-day intervals between 1st October and 30th June, and all milking cattle to be examined or treated during the same period.

In the Richmond Quarantine Area, owing to limited staff it was not possible to implement full policy. The staff maintained the dips and as far as possible supervised the treatment of all dry stock at 28-day intervals from 1st October to 30th June. Dairy herds were inspected when possible and the necessary supervision given to the treatment of infested cattle.

A considerable number of stock was treated but the number of infestations again remained very high. The position will not improve until a full policy of control can be put into operation and maintained.

West of Richmond Range a full control policy operated in Woodenbong, Bonalbo, and Northern Tabulam Areas from 1st January to 30th May, 1959. During this period all stock were examined or treated every 28 days.

Operation of Flying Gangs.—Flying Gangs comprising two senior assistants and 26 assistants operated in clean country, south of Grafton-Copmanhurst Areas, from September, 1958, until the end of May, 1959. A large area extending from the quarantine boundary south to Urunga and west to Newton Boyd was covered by them.

Some 215,928 head of stock were examined. In the eastern section four rounds and in the western portions two (to three) rounds of examinations were completed.

No evidence of cattle tick was detected, though large numbers of ticks were submitted for identification (607 bottles). Most were identified as *Haemaphysalis*, with some *Ixodes*.

A man was stationed at Macksville Abattoirs for the twelve months and examined all stock killed. No evidence of cattle tick was detected. Some 783 bottles of ticks were submitted by him for confirmation of identification. All were identified as *Haemaphysalis*, *Ixodes*, and *Amblyomma* species.

Compensation Claims.—One hundred and twenty-nine compensation claims for loss of stock by death or injury were paid; for a total of £2,004.

Fencing.—The quarantine boundary was maintained and improved. New fences totalled 32½ miles; and general repairs were done on 50½ miles.

Dip Constructions.—The Dip Maintenance Gang constructed two new dips in the Nimbin Section, to replace dips destroyed by floods in 1954. They also reconstructed a dip bath at Stanthorpe, constructed stockyards at Mungindi on the Queensland Border, and were used extensively for dip repairs in the re-constituted areas of Grafton and Copmanhurst.

QUEENSLAND BORDER CONTROL

Stanthorpe Section

Stock Movements.—Interstate store-stock movements fluctuated considerably, but by comparison with other years were not large.

There has been considerable movement of sheep to Queensland from New South Wales; mainly fat lambs drawn from New England and Narrabri areas, and marketed at Canning Hill sales, Brisbane.

Stock movements were generally well under control, and good co-operation was received from the Queensland authorities. Serious outbreaks of cattle tick occurred in Schedule T; with some cases of fever. Rigid surveillance has been maintained over stock from these areas.

Fencing.—A contract was let for some 28 miles of new fencing within the Border section Cullendore to Bald Rock. Six and a half miles have been completed. The fence, comprising four sections, commences at Stanthorpe Crossing Place and runs westerly to Bald Rock.

A contract was approved for erection of 2 miles of new four barbed wire fencing and the transfer of existing rabbit and dog netting from the old fence to the new; on Donnybrook-Limestone section of the border, west of Wallangarra. One mile of this fencing was completed and work is proceeding.

In the Donnybrook-Limestone section and further west to Mingoola, the fences are very old and have deteriorated greatly. Consideration has to be given to their early renewal. Inaccessibility and the rough nature of the country will make the project costly.

Messrs. A. W. Anderson Pty. Ltd. completed the section of fence fronting their Meat Works at Wallangarra. This is part of the border fence. The Department contributed £100 towards its cost. The firm also renewed without cost to the Department the stockyard fences where these form part of the border.

Riverton Departmental Cottage site was enclosed by sheep-proof fencing and the necessary gates. This was by contract.

Dips and Maintenance.—A sheep dip complete with yards and loading ramp was erected to Departmental specifications at the Summit Crossing Place; by the Board of Tick Control construction gang. A dam to ensure water supply was also constructed, by contract, and an engine and pump has been fitted.

The old bath at Stanthorpe Dip yards was renewed. This work was also carried out by the construction gang, who also renewed the crush; the yards and gates generally were repaired; all by the Board's construction gang.

Eighteen panels of new fence have been erected by the staff at Wallangarra dip, and general maintenance and gravelling were carried out.

Buildings.—Repairs were carried out at Maryland and Maryland-Stanthorpe cottages and a new Records and Store Room was erected.

Goondiwindi Section

Stock Movements.—Heavy stock movements from Queensland into New South Wales and vice versa were recorded in Goondiwindi Section. Stock were healthy. No report of incidence of P.P.C. was received in respect of cattle entering N.S.W. from Queensland. Lice infestation in sheep has been

rare. Stock movements were as follow:—From Qld. to N.S.W., 27,344 fat and 99,711 store cattle, 11,307 fat and 119,654 store sheep, 72 fat and 111 store swine, and 3,331 horses; from N.S.W. to Qld., 15,183 fat and 24,062 store cattle, 77,951 fat and 219,592 store sheep, 125 fat and 86 store swine, and 50 horses.

Dips and Dipping.—Analyses of samples from the four Dips within the Section showed marked variations, on a number of occasions, in the D.D.T. content of the dipping fluid. This was particularly noticeable when samples were taken from the Dips after hand-stirring, suggesting unreliable sampling. Strength of the fluid was very low on two occasions and extremely high on nine occasions.

All Dips and Yards are in good condition. A new Yard and Crush was completed at Mungindi.

Fences and Border.—Border fences are generally in a better condition than in the previous year.

A new weir was completed, approximately 6 miles west of Beebo Crossing. The storage of extra water will benefit the land holders in the vicinity, requiring water for tobacco and fodder crops. Another Weir is now being constructed in the Boomi area, a few miles west of Boronga Crossing.

A new traffic bridge across the river at Keetah Crossing was completed; steps have been taken to instal a new ramp on N.S.W. side of the border—on the roadway leading to the new bridge.

Cottages.—The seven Departmental Cottages in the Section are in good repair. Minor repairs, additions, and some painting were carried out.

West of Mungindi Section

Stock movements have been irregular. Near drought conditions in mid-year, with subsequent flood rains and flood run-off, made travel very difficult. Some routes and roads are still impassable.

Some mobs of cattle, after crossing the border, were not inspected until they were within a few miles of the nearest town—Bourke, Brewarrina, Walgett, or Collarenebri—depending on the route. Schedules C's, permitting introduction of stock into N.S.W., and monthly returns, have been very late—owing to mails not running (in some cases) for months.

More co-operation is being received from owners, agents, and drovers, with regard to Form 181 (Queensland Health Certificates); but arrears are so great that extensive travel is involved in the issue of these Forms.

The part-time Border Inspector (a policeman) at Hebel has reported that stock movement through Hebel crossings are so heavy, particularly by transport, that he will be unable to cope unless stock movement eases in the near future.

Stock Crossings.—The movements were as follow:—From Qld. to N.S.W., 37,682 cattle and 131,530 other stock; from N.S.W. to Qld., 901 cattle and 72,109 other stock.

West of Hungerford Section

Stock Movements.—The movements were as follow:—From Qld. to N.S.W., 2,617 cattle; from N.S.W. to Qld., 2,100 cattle.

Stock on Routes.—Three mobs of cattle were supervised whilst on the Stock Routes in the Tibooburra District. These do not include sheep moving from one Station to another within N.S.W.

Lice in Sheep.—Inspections were made for lice in sheep, but all inspected properties were clean. Station holders are now dipping their sheep, without supervision by an officer of the Department of Agriculture.

Liaison with Flying Stock Inspector.—Contact has been kept with the Flying Stock Inspector, Broken Hill.

Seasonal Conditions.—Little rain has fallen. Feed is still found on the Stock Routes but is dry. Watering places on the Routes are almost devoid of water, although the local Pastures Protection Board has had four tanks in this District (Mokely, Packsaddle, Milparinka and Double Tanks) cleaned out and a number of 20,000 gallon concrete tanks erected on bore sites.

Research Services

RESEARCH—TICK BOARD LABORATORY

DDT Degradation Rate on Hair of Dipped Cattle.—Some 327 samples of hair were analysed for presence of DDT in the course of observations. The degradation curves of hair deposits have indicated a fairly constant rate of degradation; i.e., the amount of DDT remaining at a given time after dipping represents a fairly constant portion of the original deposit. It further indicates that a half life value for deposits can be calculated. The half life value has varied from 5.5 days to 10.5 days. Further work will be undertaken in this matter.

Determination of DDT in Hides.—To determine the amount of DDT in the hides of dipped cattle, a trial was carried out at Wollongbar Experiment Farm. Only a small amount of hide was available for testing, and the results were not conclusive; but there did not appear to be any build-up of DDT in the hide. Further observations will be made.

DDT-Diazinon Dip; Observations on Effect.—The one DDT-Diazinon Dip in the area has been maintained for a further twelve months. On field observations, the dip at a strength of 0.5 per cent. DDT and 0.05 per cent. Diazinon has been entirely satisfactory for control of cattle tick infestation.

Diazinon and DDT Deposits on Hair of Dipped Cattle.—Some work was undertaken in association with the firm which supplied the Diazinon.

The results indicated:—(i) that the amount and distribution of Diazinon deposit on the hair varied from animal to animal, the belly retaining the most, and the mid-rib the least; (ii) that DDT deposition followed a definite pattern; the top line retaining the most, and the mid-rib the least; (iii) variation in DDT deposits was not constant with either the length of hair or the Diazinon deposition; (iv) only 19 per cent. of the initial Diazinon deposit remained after four days, and after seven days it had almost entirely disappeared—the lack of retention in these trials was attributed to the prevailing high temperatures and the short coats of the animals.

Observations on a Diazinon Sheep Dip.—A sheep dip was charged with Diazinon to treat sheep moving into New South Wales from Queensland. Observations showed a high stripping rate, and that maintenance of the dip strength was a difficult problem. They also indicated risk of bacterial contamination, which caused subsequent lameness in the treated animals. As a result, the dip was emptied and recharged with arsenic.

Hardwater Rucide (DDT) Dip.—Observations were continued on a dip charged with special hardwater Rucide. It behaved very satisfactorily, even though the water contained 3,000 PPM CaCO_3 and 8,000 PPM NaCl .

Settling rate of the dip was abnormal, and during the settling a compact layer of flocculates developed. This caused an abnormal rise in DDT concentration at the 3 feet level, from which the samples were usually taken, and resulted in delayed settling.

The relative wettability of this dip was found to be 3.5. This is considerably greater than normal Rucide dips, charged by a pre-mix technique, in waters of similar hardness and salt content.

Chlorinated Hydrocarbon Dips—Care and Maintenance.—(i) Work was undertaken to determine whether the normal stirring of dips prior to dipping was being carried out efficiently. The results indicated that in most cases the field staff stir the dips effectively.

(ii) There was difficulty in analysis of dips containing newer surface active agents; indicating a need to alter the methods of analysis. Dehydrohalogenation methods had been found reliable when Rucide was used; but the newer surface active agents which replaced Brinol are more active and render the times of dehydrohalogenation quite critical.

Alternative methods, of total degradation or dehydrohalogenation at room temperature, are being considered. The laboratory is being tooled up to meet these requirements.

(iii) Some dips charged with Timbrol's DDT showed evidence of DDT settling in a putty-like mass. This was thixotropic and became fluid when agitated. Investigation showed that it could be overcome by two means:—(a) by adding mud to the dip at the time of charging, fine mud being more effective than sandy mud; (b) by shovelling the sediment on to the ramp, where it was trodden into a suspension by the cattle used for stirring the dip.

It was noted that the difficulty was only temporary, and ceased as soon as the dip became "dirty".

(iv) Three dips were maintained with Ruciae, using a pre-mix technique, originally suggested by I.C.I.A.N.Z. This involved the use of trisodium phosphate and calgon. Various quantities of these two solvents were added to 40 gallons of hardwater, to which was added 56 lb. of Rucide, after heating.

Behaviour of the dips, including settling-rate characteristics, has been quite comparable to the ordinary Rucide, despite extreme hardness—ranging between 1,600 and 2,000 PPM CaCO_3 . Hair analyses indicated that DDT deposits on the hair were comparable with those from cattle treated in normal Rucide dips.

Relative Wettability of Dips.—Further work has been undertaken to standardise the technique of observations on relative wettability of dips; to determine how dip solutions behave in their ability to wet objects passing through them.

Head Wetting.—It had been observed that ticks survived in the ears of cattle, treated in DDT, presumably due to low deposits of DDT, through ineffective wetting during dipping. Therefore, methods for improving head wetting are under investigation.

Preliminary work has included observations on use of baulks to force the cattle to keep their heads down in the dip, the use of dual hand-operated sprays; and altered take-off entrances to dips.

Use of baulks merely slowed the rate of progress through the dips. Dual sprays were still ineffective in eliminating ear infestations. Use of altered take-offs did not ensure thorough immersion of all cattle.

Further work will proceed in this project, and in use of fluorescent dye to indicate wetting efficiency.

DDT in Milk from Dipped Animals.—A trial was commenced to determine the extent to which DDT was excreted in milk following treatment of cattle in two different DDT preparations.

Toxicology of DDT and BHC.—Sixty-eight DDT and BHC determinations of specimens of liver, kidney, brain, and omentum were carried out, in connection with toxicity experiments undertaken by the Veterinary Research Station, Glenfield.

Toxicology of Arsenic.—One hundred and forty-seven samples were analysed. In sixty-five cases, arsenical poisoning had occurred; in seventy-two cases the animal's death was not due to arsenical poisoning. The ten remaining were doubtful.

Cattle Marking Paint.—The analyst undertook the manufacture of further quantities of animal marking paint and is satisfied that satisfactory material is now being produced at a reasonable cost.

VETERINARY RESEARCH STATION—GLENFIELD

Staff.—Mr. Grahame Edgar, Director of Veterinary Research since 1947, has taken up appointment as Assistant Under Secretary for the Department, after thirty-two and a half years' continuous service at Glenfield Veterinary Research Station.

Mr. J. C. Keast, Principal Veterinary Research Officer, is overseas, having attended the International Veterinary Congress at Madrid in May, 1959, followed by a tour of the United Kingdom and the United States. He will return to duty in August, 1959.

Two research officers appointed under the Pastures Protection Board Subsidy resigned; one to accept a position with the Faculty of Veterinary Science, University of Sydney, the other for work on nematode parasites of cattle in southern New South Wales. Another resigned to accept a scholarship with the Veterinary School at Guelph, Canada.

Visitors.—The Station, as in the past, provided training facilities for students under the Colombo and United Nations plans.

Mr. C. S. Shanta, Veterinary Research Institute, Malaya, visited during March, 1959, for general experience in pathology and bacteriology of common animal diseases in New South Wales, with special attention to poultry. Mr. A. K. Uppal, Mallurkat, West Pakistan, commenced his studies in March and has remained to the end of June, 1959.

Mr. Abdul Aziz, Assistant Director Animal Husbandry, Perkarwar, Pakistan West, was present during February, 1959, and paid particular attention to Bovine Infertility.

Field Days, and other Extension.—Two field days were held, one for the annual Veterinary Inspectors' Conference, the other for delegates of the Pastures Protection Board Annual Conference. In addition, a practical day was held for the Veterinary Inspectors' at the request of their Association for demonstrations of veterinary operations and participation by the Inspectors. The programme included vasectomy, semen collection and examination, epididymitis examination in rams, and tail-bleeding of cattle.

The District Veterinary Officers' Conference was held at the Station, and included a symposium on Infertility and Venereal Diseases of cattle.

Research Officer Mr. McBarron delivered to the Ando and Marulan branches of the Agricultural Bureau two lectures on trace elements and feeding standards in livestock nutrition; addressed Regional Conventions at Nowra and Wauchope on diseases in dairy cattle, and animal nutrition; and lectured to Agriculture IV students at the University Farm, Cobbitty, on urea toxicity in sheep.

Seminar Series.—During 1959 a series of monthly seminars was inaugurated at the Station, but open to visitors. Topics treated to date comprise ovine brucellosis, trichomoniasis and vibriosis, urea metabolism and toxicity, Johne's disease, vaccination against infectious laryngo-tracheitis in poultry and carbon tetrachloride poisoning.

Veterinary Diagnostic Services.—

Specimens Examined	1958-59	1957-58	1956-57
Cattle	16,964	26,534	36,503
Sheep	3,129	1,824	998
Horses	63	48	58
Pigs	907	1,140	1,343
Poultry	5,377	3,566	4,336
Miscellaneous Animals and Birds	237	250	236
Miscellaneous Other Specimens	342	412	298
Totals	27,019	33,774	43,763
Entries in Specimen Register	4,449	4,330	4,910
Inspections under the Noxious Microbes Act	14	20	20

Myxomatosis.—The demand on the Station for myxomatosis virus has persisted, although not as heavy as in previous years. A total of 126,625 doses was despatched in 1958-59, comprising 4,997 ampoules, in response to 653 requests; compared to 152,425 doses, 6,097 ampoules, in 1957-58.

Publications.—Six research papers and two extension articles were published during the year (see Appendix II). Ten papers are in press and should be published within the near future.

Bull Testing, for Artificial Insemination Centres.—Fifteen bulls were tested for fertility, freedom from disease, and general suitability for A.I. centre service; two for the Aberdeen Centre and the remainder for Graham Park, Berry.

One Aberdeen Angus bull is being tested for transfer to Graham Park, for transmission of semen to North Borneo.

Training of A.I. Personnel.—Instruction in the principles and practice of artificial insemination was given to 12 students; six from New South Wales, two from Canberra, and two from Northern Territory.

RESEARCH—ARTIFICIAL INSEMINATION

Using live/dead (L/D) staining it was found that, with undiluted semen held for three weeks at 5 degrees C., up to almost 50 per cent. unstained spermatozoa ("live") were present in some samples. This contrasts with an examination for activity on the warm stage of the microscope, where 100 per cent. were classed as inactive, i.e., "dead".

Reconstituted skim milk was found not to require further heat treatment for successful use as a semen diluent. Different temperatures are involved in different methods of powdering such products, and sterilising effects may vary accordingly.

Observations regarding use of bipolar rectal electrodes to induce ejaculation indicated that good contact with the mucosa is essential.

VETERINARY RESEARCH—CATTLE

Hypomagnesaemia in Cattle.—Observations on magnesium levels in herbage at various seasons were continued at Kangaloon. By overseas standards, no deficiency has yet been demonstrated in the control or the treated plots. The latter were dressed at the rate of 5-40 cwt. of dolomite per acre. Cases of hypomagnesaemia continued to occur in the metropolitan area in the autumn, and on one property this was the third successive annual occurrence. Calcined magnesite was administered but the effect, beneficial or otherwise, could not be assessed, as the number of cases in the area declined sharply after supplementation commenced.



"Flock Improvement through Fleece Measurement"

Agricultural Bureau field days continued to draw good extension gatherings. At this Quandialla field day, in Lachlan Division of the Agricultural Bureau, there was special interest in the District Sheep and Wool Officer's demonstration of the need for fleece measurement by weight, in lieu of estimation, in flock improvement. After graziers had estimated fleece weights, the sheep were shorn and the fleeces weighed.

(Photo—Agricultural Bureau)

Milk Fever in Cattle.—Trials were undertaken with an oily suspension of Vitamin D, to examine the calcaemic power in calves. A slight response was noted.

Phosphate supplementation trials at Yanco Experiment Farm have been discontinued, as no case of milk fever occurred in treated or control cows.

Epizootic Diarrhoea of Cattle.—Investigations commenced soon after this disease first appeared in the State, including transmission studies with faeces, and feeding trials with suspect imported foddors.

The disease was shown to be transmissible by a filterable agent. Original source of infection was not determined.

Rapid spread of the disease in the district of Cumberland reduced the availability of animals for transmission experiments. On account of this, experimental work was curtailed.

Mastitis.—Although there was no planned research into this disease, specimens were examined for diagnostic purposes—allied with attempts at eradication or control by field officers. Two unusual infections were observed, a single *Nocardia* sp. infection in one herd, and a group infection by *Klebsiella pneumoniae* in another.

A few cases of *Corynebacterium pyogenes* infection associated with mastitis occurred in the autumn. The total of cows involved is unknown, but the disease was in an exceptionally severe form.

Ephemeral Fever-like Disease in Calves.—This has been observed in the Tamworth district since 1928 as a disease of summer incidence. It was investigated in 1942 and considered to be Ephemeral Fever; but this diagnosis has been queried, and further transmission trials were done during the past year.

The disease was instantly transmitted by blood, producing a clinical picture of fever, anorexia, rapid wasting, and lameness. On post mortem examination, serositis and arthritis appear to be characteristic. Degenerative lesions were observed in the skeletal muscle of one experimental animal.

Bovine Tuberculosis.—A tuberculosis outbreak in cattle in Peak Hill municipality was mentioned in the Annual Report, 1957-58. Human type of tubercle bacilli was involved. Soil samples from the night soil depot, the dam associated with this municipal depot, and from other sites suspected of being a reservoir of infection were examined for viable tubercle bacilli. None was recovered from any sample; so the infection source has not been traced.

Johne's Disease.—A complement fixation test for detection of Johne's Disease in cattle was introduced during the year. Some samples have been examined. The test appears to be satisfactory.

Toxicity of Sorghum for Cattle.—Two plots of one acre, Sweet Sudan (S.S. 6) sorghum, and Perennial Sorghum (*Sorghum alatum*), were sown in October, 1958. Levels of HCN were examined at regular intervals, where the crops were (a) allowed to grow to maturity and (b) grazed when 18-24 in. high, allowed to regenerate to the same height and strip-grazed. Three grazings on each crop were achieved between December, 1958, and May, 1959.

HCN levels were much higher in Perennial Sorghum, reaching 0.080 per cent. in the immature and young regrowth stages. The percentage of HCN on a wet matter basis in both species fell to 0.010 per cent. HCN as the crops matured.

No case of toxicity occurred amongst steers grazed on the sorghums, but no attempt was made to increase the probability of toxicity by prior starvation and management. Additional observations are proceeding.

Bovine Vibriosis.—Of 787 bovine samples submitted to the vaginal mucus agglutination (VMA) test for vibriosis, 11.7 per cent. gave positive, 5.8 per cent. doubtful, and 82.5 per cent. negative reactions. These figures probably give a better indication of the incidence of bovine vibriosis in this State than do those taken out on a herd basis.

The samples were received in 138 consignments, mostly from different herds. 56.5 per cent. showed at least one positive, and a further 8.7 per cent. at least one doubtful reaction, leaving only 34.8 per cent. entirely negative.

During the last four months to June, 1959, 533 individual samples in 93 lots were tested, following a preliminary trial period in which there were 254 samples in 45 lots. In the trial period 44.4 per cent. of the herd and 76.0 per cent. of the samples were negative.

Results, to date, on the basis of these tests, suggest that—where vibriosis is among the factors suspected in problem herds—perhaps 50 per cent. of such herds and 10 per cent. of the selected cows are positive. Not infrequently, one or more of the following other factors are operating concurrently: —brucellosis, trichomoniasis, copper deficiency, overworked bull, malnutrition, hormonal imbalance, genetic factors, and possibly viral infection. The effects of vibriosis might themselves be influenced by such other factors.

Copper deficiency has been found in association with vibriosis, and with trichomoniasis and vibriosis also, in some north coast areas following periods of excessive rainfall. Anoestrus generally has been a feature of such cases.

Investigational work with five strains of *V. fetus* at Glenfield indicated the need for caution in the evaluation of the catalase test as a criterion of pathogenicity. In each case it was possible to produce layers of growth of catalase-positive, catalase-negative, and "intermediate" vibrios, from the same strain and from single inoculum. This occurs in tubes of sloppy (0.15 per cent.) nutrient agar incubated in air; discs of growth differing in catalase activity appearing at different levels.

Ordinary (nutrient) agar, regarded by many workers as unsuitable for *V. fetus*, was found helpful also in growing this organism in quantity for antigen production for agglutination test purposes.

Techniques were developed for using both solid and semi-solid preparations. The semi-solid or sloppy form gave a rather higher yield of cells; but the antigenic material when harvested and prepared in the ordinary manner formed a semi-gelatinous mass, making more difficult the interpretation of VMA tests. (This problem appears to have been encountered by workers in other laboratories using fluid or sloppy media.)

A quite satisfactory method of overcoming that difficulty, involving double centrifugation at different speeds, has been developed.

When using solid sugar, it was found that careful harvesting by means of normal rather than formolized saline allowed of repetition of the process; thus, more than one batch of antigen could be obtained, simply by reincubating the same medium without further inoculation.

In setting up VMA tests, positive material from previous tests is used as a control. One such sample at present in use is still strongly positive after two months storage. This is of interest in connection with possible delays in testing vaginal mucus samples, suitably prepared, for *V. fetus* agglutinins.

Trichomoniasis.—Sloppy nutrient agar (0.075 to 0.1 per cent. with aq. dest. or, preferably, broth) was found suitable as a culture medium for *T. foetus*; and with the advantage that these flagellates retain their characteristic morphology better than in other media so far used.

No reference to the use of this medium for these protozoa has been found in the literature.

Observations involving comparisons between various other culture media, and longevity of *T. foetus* in different types of specimen material from the field, were continued. Viable trichonomads were still present in one sample of malodorous utero-vaginal discharge after thirteen days at room temperature.

VETERINARY RESEARCH—SHEEP

Carbon Tetrachloride Poisoning.—Work continued along the lines of defining the biochemical pathology of poisoning, using large doses (50 ml.) of carbon tetrachloride.

As well as the expected liver dysfunction, a severe degree of kidney dysfunction was produced. In connection with this work, a test has been developed for estimating simultaneous liver and kidney function in wethers.

In some field cases a variable degree of liver dysfunction has been found but in most cases a moderate to severe degree of kidney dysfunction was also present.

The work suggests that the kidney is at least involved in the pathology and widens the field of predisposing factors.

Neonatal Losses in Lambs.—Investigations were undertaken in Crookwell district. Tests were made of liver and kidney function, blood glucose, liver glycogen and liver vitamin A, thyroid iodine, plasma protein bound iodine levels.

Hypoglycaemia with low liver glycogen was a constant feature. The liver vitamin A seemed less than the very small amounts usually present. It is considered that these findings can be connected, in part, with the apparent but transient benefits of glucose therapy. Trials with vitamin A are in hand.

In co-operation with Mr. Lascelles of the University of Sydney, hypothyroidism was produced in pregnant ewes with methyl thiouracil. Estimations of total and relative concentrations of thyroid iodine together with radiological assessment of the osseous maturation of the skeleton at birth were found to be the most sensitive and reliable indications of hypothyroidism in lambs. This data was superior to that of protein-bound iodine, plasma liquids, plasma calcium concentrations, and observations on body weight and length.

Creatinuria in Relation to Vit. E. Deficiency.—In connection with suspected Vitamin E deficiency in sheep, creatinuria was reported to be a diagnostic point. The literature conflicted on the amount of creatine normally excreted by sheep; this appearing to be based on the estimation method used.

Specific chromatographic analysis was applied to normal sheep urine and found almost as much creatine as creatinine. This is in contrast to adult humans; confirmed as excreting creatinine and no creatine.

The findings render creatinuria invalid as a diagnostic aid in suspected vitamin E deficiency in sheep.

Gallstones in Sheep.—Gallstones from a sheep were analysed; and found to contain very little cholesterol and mainly biliverdin. Thus they are analogous with "pigment stones" of men, except that these contain mainly bilirubin. Bilirubin was not detectable in the sheep gallstones analysed.

Urinary Calculi.—Calculi from sheep were examined, from eleven sources. Of these, nine were composed of calcium and magnesium carbonates, one was composed mainly of silica and one of unidentified organic matter.

Ovine Brucellosis.—The complement fixation test has been introduced, and diagnostic tests commenced. Preparation and standardisation of antigens still require careful attention, and the basis for interpretation of results may warrant future revision.

A trial has commenced, in which *Br. ovis* challenge of young rams by various routes is followed by weekly serological and fortnightly bacteriological and physiological examinations. To date, infection has been successfully established by intratesticular injection or preputial washing but not by intravenous or oral exposure.

Eperythrozoonosis in Sheep.—*Eperythrozoon ovis* was identified for the first time in Australia. It was associated with a mortality in lambs in Cootamundra district. The organism was recovered by animal inoculation, and passed serially through sheep to study the relationship of parasitism to anaemic changes, treatment, splenectomy, diurnal variations, the nature of premunity, and carrier status.

Evidence has been obtained that the parasite is not uncommon, and its development of pathogenicity depends on complicating factors.

Enterotoxaemia in Sheep and Cattle.—There was unusually heavy incidence last spring, in sheep and cattle. In several cases, losses occurred in vaccinated animals.

The condition in cattle was complicated by bloat; and varying degrees of congestion and haemorrhage were noted in the tissues of the head, neck, and forequarters. Positive diagnosis of enterotoxaemia could only be made in one or two cases. Cattle material received was generally not ideal for diagnosis of this condition.

VETERINARY RESEARCH—PIGS

Tuberculosis in Pigs.—Over the past twelve months material was received from eleven pigs suspected of being infected with tuberculosis. In four cases, tuberculosis was confirmed. In each of these, the human strain of tubercle bacillus was identified. The source of infection remained obscure in each case.

VETERINARY RESEARCH—DOGS

Toxoplasmosis in Dogs.—Members of the medical profession became interested recently in the suspected occurrence of toxoplasmosis in a family. Two dogs owned by members of this family fell under suspicion as a possible source of infection. Arrangements were made to examine the animals at the V.R.S.

The dogs were admitted to Glenfield Veterinary Research Station and kept under observation for several weeks. No abnormality was detected. One of the dogs whelped three pups during this period. No significant finding was apparent on post mortem examination of these pups.

One dog gave significant and one gave suspicious titrates to both the complement fixation and dye neutralisation tests for toxoplasmosis; but no macroscopic or histopathological lesion was detected at post mortem.

VETERINARY RESEARCH—POULTRY

Avian Monocytosis.—Avian monocytosis continued as the main problem in the poultry industry. In fact its incidence rapidly surpassed the 1957-58 period, accounting now for 80 per cent. of all diagnosis of poultry diseases at Glenfield Veterinary Research Station.

The final aetiology of this disease is not yet known, but accumulating evidence supports the theory that industrial feeding may be responsible for it. An unknown toxic factor present in commercial meat meals may be incriminated for interference with metabolism. Elimination of meat meals from poultry rations, or their replacement by vegetable proteins, eliminates the incidence of Avian monocytosis.

The most effective treatment up to four days after symptoms appear comprises 24 hours' starvation, followed by an addition of five ounces molasses per gallon to drinking water and reduction of the protein content of mash by mixing one part of mash with one part of mixed pollard, bran and oats—for a period of five to seven days.

Terramycin or aureomycin given in high concentration (30-40 lb. per ton of mash) for four to six days is equally efficient but more expensive.

A few outbreaks of Avian monocytosis resisted any treatment.

Continuing experiments at Glenfield substantiate the opinion that Avian monocytosis is not an infectious disease.

Encephalitic Syndrome in Ducklings.—Only one more case was examined. The disease confined itself to one duck farm. The birds presented the symptoms of pronounced shivering, continuous flutter of wings, leg weakness, and occasional twisting of the neck and head. Only young birds were affected, up to eight weeks of age, with peracute course of the disease yielding 100 per cent. mortality in affected birds. Sulphaquinoxaline stopped the spread, but was without effect in birds already showing symptoms.

Corynebacterial Infection in Budgerigars.—Further experiments examined the pathogenicity, for guinea pigs, of *Corynebacteria* isolated in the previous year from budgerigars. They were non-pathogenic; but produced degrees of immunity in guinea pigs against *C. ovis* when challenged one month later by the latter.

New experiments are planned, to develop by this means a vaccine against *C. ovis* in sheep.

Aspecific Paralysis of Parrots.—This paralytic syndrome could not be transmitted into mice by intracerebral inoculation of suspension of parrot's brain. Budgerigars kept in contact with the infected parrot remained healthy.

Vitamin A deficiency is believed to be the cause of this complaint.

Infectious Laryngo-tracheitis.—Four trials were carried out between November, 1958, and May, 1959, to test whether lyophilized egg-adopted vaccine gives a satisfactory protection against natural outbreaks of infectious Laryngo-tracheitis.

One half of the experimental birds in each trial were obtained from farms where vaccination had been done by veterinary practitioners using natural virus. The other half was obtained from Hawkesbury Agricultural College where lyophilized egg-adopted vaccine as prepared by the Commonwealth Serum Laboratories, Melbourne, was used.

The birds were challenged for immunity by intra-tracheal route and by spraying with an atomizer. The groups were 7, 13, 17, 23, 30 weeks and one and two years post-vaccination.

Nearly all challenged birds developed infectious Laryngo-tracheitis; and differences in mortality between the two sections were not statistically significant.

TOXICOLOGY RESEARCH

Miscellaneous.—The various "suspected poisoning" specimens, submitted from 212 sources, involved 481 analyses.

Arsenic accounted for 45 of the mortalities; sheep in 15 cases (1,372 head), cattle in 28 cases (104 head), pigs and horses each one case.

Of the sheep, 1,329 deaths occurred on eleven properties after dipping. Factors considered to have contributed to these mortalities, according to the ascertained histories, included:—dipping off shears; dipping sheep carrying 2-4 months fleece; dipping during the afternoon; dipping during rainy weather; keeping dipped sheep in a shed overnight; and dip ingestion.

Lead poisoning accounted for 13 mortalities; 26 head of cattle. Oxalic acid poisoning accounted for five mortalities, 110 sheep. Phosphorus—three mortalities. Strychnine—six mortalities; and in a case of suspected lead poisoning in horses, 7 p.p.m. of cadmium was found in the kidney—source of the cadmium unknown.

B.H.C. and D.D.T. Calf Dipping Trials.—Effect of dipping calves in a wash containing B.H.C. and D.D.T. of known concentration was further studied. Thirteen calves of mixed breeds, and ages ranging from seven to eighteen weeks, were used in the trial. All were maintained in good condition throughout the trial by supplementary feeding, and worm free by regular faecal examination and treatment as required. Weight gains were recorded over the period.

The wash was maintained at 0.5 per cent. p.p.i. DDT and 0.03 per cent. G.I. BHC throughout; and the calves were exercised for one mile at a brisk trot before and after dipping.

At no stage were typical symptoms of BHC toxicity produced. At the end, all but the youngest (which died during the trial) were in very good condition. They had gained considerable weight.

Nitrite Poisoning in Sheep—Research on Diagnosis.—Further work has shown that methaemoglobin estimation on whole blood is unsatisfactory as a diagnostic procedure when the specimen is examined later than 24 hours after collection.

On the other hand, it was possible to detect nitrite in dried blood smears or serum preserved with boracic acid at least one week after collection, using the Diphenylamine Blue spot test method. In addition, nitrite could be readily detected in serum from a carcass dead for 24 hours.

Urea Toxicity.—Investigations continued. The effect of fill of the sheep was found to be one of the major factors affecting the toxicity. The longer the period of starvation before feeding a sheep urea, the greater are the changes of toxicity.

Feeding the urea with a readily available form of carbohydrate, such as molasses, does render urea less toxic. Sheep were fed up to 18 grams of urea with 72 grams of molasses without effect, while others were toxic to a dose of 8 grams of urea fed alone.

Feeding of wheat with urea gave some protection against toxicity. It was possible to feed sheep 8 grams of urea in 4½ oz. of wheat without toxic effects. However, the sheep were in good condition and had been fed up to the time of the experiment.

Blood ammonia levels were taken in all trials and the symptoms and post mortem observations were recorded.

SHEEP DROUGHT FEEDING RESEARCH

Further trials at the Burdekin Unit investigated the utilization of low quality roughage, with emphasis on urea as a protein supplement. The 1958-59 trials were designed to study the effect of different rates of urea intake, and the effect of different amounts of sodium sulphate on urea response.

Whole wheat and crushed wheat as carbohydrate substrates were also compared. Urea mixed as a dry form was compared to a 50 per cent. urea solution sprayed on whole wheat, cracked wheat, and roughage.

The Merino ewes used in the trials were fed a high quality ration after the experimental period of twenty-four weeks had concluded, and were transported to Condobolin Experiment Farm. There, their breeding performances as affected by the drought ration will be studied. Meantime, progress observations are reported in the next four paragraphs:—

Sodium Sulphate in re Urea Response.—It would appear that sodium sulphate has no effect on the utilization of urea. This is reflected in body weights and survival numbers.

Urea Intake Rates.—From study on the different rates of urea intake it seems that the slower the urea is consumed the better it is utilized by the sheep.

Urea Mixed with Weekly Supplement of Roughage.—Survival numbers and body weights of sheep show that the urea fed by mixing the weekly urea supplement with roughage was better utilised than where the identical urea ration was mixed with a twice weekly supplement of wheat. In the latter case the wheat and urea mixture were consumed at a much faster rate.

Spraying the Urea Solution on Cracked or Whole Wheat.—This gave protection against urea toxicity, but the body weights of the sheep were not superior to the group where urea was used as a dry form.

Dispersing of Urea in Mixtures.—Dispersion of a 50 per cent. solution of urea when mixed with 80 lb. of wheat was investigated in conjunction with Burdekin Trials. Distribution of the solution was very close to the theoretical mean. Three minute mixing of the ration in a Bungler mixer, capacity 400 lb., was better than a one minute mix.

Stability of Urea in Mixtures.—Mixtures of urea solutions and roughage or wheat were examined after seven and ten days to determine the effect of this period on urea decomposition. The different mixtures varied as from and between the mixture used at the Burdekin trials and the extreme of saturation with water.

Results indicated that the stock quantities desired at the Burdekin could be held for at least seven days, with very small loss of urea (13 per cent.). However, the results showed that, when the whole wheat plus urea solutions were mixed and fed in troughs, urea loss could occur if excessive water entered the troughs as a result of rain.

Copper Trial on Drought Feeding.—As rations for some trials at the Burdekin Unit involved the additions of rather large amounts of sulphate to a feed deficiency of copper, liver copper analyses were performed on a number of sheep. These analyses were taken monthly by biopsy, and a chemical method was used for estimation of liver copper.

One group of sheep was fed a ration including sodium sulphate equivalent to 31 per cent. of the 6 grams of urea. The other group, the control, received an identical ration—except for the exclusion of sulphate. In both groups, the liver copper figures showed a gradual rise over the three months; but the mean increase of copper was higher in the control. There was no sign of copper loss in the liver of the sulphate treated group.

SHEEP NUTRITION—SHANNON VALE STATION

The year provided a most striking contrast in seasonal conditions, one of the most striking on the northern tablelands for some 20 years.

The 1958-59 summer and the autumn of 1958 were dry and very hot, and the 1958 winter was commenced with no carry over of feed or of autumn growth. This was the nearest to continuous drought conditions since Shannon Vale Station commenced operations in 1939. Prospects for the 1958-59 summer did not appear bright; but 20 inches of rain between early December, 1958, and the end of March, 1959, produced extravagant growth, and there is sufficient soil moisture for a good 1959 winter.

In spite of the dry conditions, stock health was good. Young sheep did not grow well, but losses were few. The situation again strikingly showed that by good management any given and limited amount of feed could be intelligently rationed out to the various sheep types according to their cyclical needs. In fact, the excessive growth of the 1958-59 summer and 1959 autumn caused more difficulties than the previous dry period. Fly strike and worm infestation were heavy; young sheep did not do well, and there were considerable losses. Two hundred additional ewes and hoggets were obtained from Trangie Experiment Station, and at 2,000 sheep the Station is still not heavily stocked.

Grazing Comparison, on Sown Pasture.—The comparison between 7 and 3½ days per week grazing on sown pasture, commenced in 1951, was terminated last year. It yielded valuable information. The report is awaiting publication.

Post-mating Nutrition of Breeding Ewes.—This experiment is now in its third year. Progress results suggest that valuable mid and late winter feed may be usefully diverted to other purposes; by rationing the ewes for the first 70-100 days of pregnancy, with little loss to their productivity.

Trials of Very Late Lambing.—(Commencing dates November 28, December 12, and December 26.) This is again being repeated. Results from the two previous years suggest that for these late dates the conception rates may not be high enough to offset the advantages of a mid winter sucker market.

Management; Relative to Efficiency of Wool Production.—Much attention is now being given to efficiency of wool production, as affected by pasture-intake management and by animal selection on basis of individual efficiency. Measurement of intake and correlation with body weight have been in progress since October, 1958. Encouraging results are showing.

During the dry period, 400 wethers were run for six months at 22 per acre and yielded approximately 7 lb. wool per head; underlining the possibilities inherent in rationed feeding.

Techniques of pasture management are being further investigated with emphasis on the pre-planning of paddock use.

Visits to the Station by individuals and by large and small groups are becoming very frequent, and reflect widespread interest in the management system. The system is quite

unusual and provokes a lot of interest and discussion in the visiting groups. Similarly, the Station's Annual Field Day, held in October, 1958, was well attended and again well received.

Wool return last year was 20 lb. per acre over the whole property; only a slight decrease on that of the previous season despite the conditions. A considerable increase is expected at the next shearing.

WOOL RESEARCH—TRANGIE STATION

Experimental Flocks.—Five experimental flocks are run on Trangie Agricultural Experiment Station. These include a flock commenced in autumn, 1959, of 300 ewes and six rams used to estimate the fertility of the Trangie strain under optimum conditions of breeding and management.

Single Character Groups.—The project involving the ten single character groups has been continued, using the comparison between stud and Selection Demonstration flocks.

The fleece measurements for the eighteen months old ewe progeny of these flocks at the 1958 shearing (June) have been examined.

The results demonstrate the rapid changes which selection can make on fleece weight and its associated measurements. For example, there is now a 35 per cent. difference in clean fleece weight between fleece plus and fleece minus; and a 37 per cent. difference in count between crimps plus and crimps minus. These figures are expressed in relation to the Random Spring flock used as controls.

Fleece-Measurement Aids Tested.—At the 1958 shearing, the value of two fleece-measuring aids developed by Professor Neale of New Mexico were examined. The first was a squeeze machine, said to estimate the amount of clean wool in a fleece; and the second was a meter for measuring the density of fibres on the living sheep.

Correlation between greasy fleece and clean fleece weights, and estimates of the clean fleece weight as calculated from the machine were compared. It was concluded that the squeeze machine had no place in the wool industry.

Neale's density meter was used on forty rams, in comparison with routine density measurements. The result showed no correlation with the density estimates of number of fibres per square inch.

Inheritance of Poll Merino Characteristics.—Further results are now available in the project establishing the phenotype of the homozygous poll ram.

At the autumn, 1958, mating the seven ram progeny produced by mating a HH ram with HL ewes were progeny tested. Initial findings show that rams with depressions were homozygous polled (HH) while the five rams with short horns were heterozygous Hh.

Relative infertility of an imported homozygous poll ram, despite an apparent libido and an excellent semen examination, has continually hindered the project.

Influence of Poll Gene on Production.—Further evidence confirmed the suspicion that the poll gene H is slightly deleterious in a single dose.

Experiments are in progress to establish a mechanical de-horning method, to give the advantages of polling without the genetic risk.

Fold Development, and Fertility.—Further evidence has been obtained that fold development does exert a depressing influence on fertility.

DAIRY CATTLE NUTRITION RESEARCH—WOLLONGBAR EXPERIMENT FARM

Vetch Grazing Trial.—In this trial, designed to compare two grazing systems, two matched areas of 25 acres were chosen. Upon each were placed ten head of paired cows. One herd of ten cows was run on natural grass whilst the other herd had access to five acres of vetch planted in April-May as an early spring fodder.

Preliminary results indicate that the cows which received supplementary vetch gave better production and were in better body condition at the end of lactation than were the cows which only received natural pasture.

Silage Investigations.—Digestibility trials were undertaken on grass silage at the Wollongbar Experiment Farm. It was found that dry matter and protein digestibility coefficients were much lower compared with comparable overseas figures. Preliminary investigations on the digestibility of the parent material (Kikuyu grass) are in progress.

Separated Milk Calf-feeding.—An experiment on separated milk feeding, for raising dairy calves, was completed in June, 1958. It was designed to compare various systems of feeding; including feeding separated milk, with or without Vitamin A supplements, from the end of the second week.

The results supported the Wollongbar system of calf rearing. This produced the best calves throughout the whole trial. It comprises whole milk until the end of the third week, then gradual breaking down with separated milk—until, at seven weeks of age, only separated milk is fed.

Early Weaning of Calves.—A trial was commenced in August, 1958; to test the effect of early weaning on calves where they have access to good quality pasture. Two rations were used, one with 20 per cent. dried buttermilk, crude protein content of 27.7 per cent., and one with 10 per cent. buttermilk, crude protein content of 22.4 per cent. Weight gains under these systems were quite satisfactory and at the time of this report, June, 1959, it is impossible for a casual observer to tell the difference between early weaned and normally weaned calves.

The system does produce reasonable calves but, from an economic viewpoint (whilst it may have a place in the whole-milk zone), it is far too costly to be practised in butter production areas.

PIG NUTRITION RESEARCH—WOLLONGBAR EXPERIMENT FARM

Sucker Rations.—A large scale experiment has been undertaken to see if the addition of buttermilk powder to suckers' rations affects their weight gains. The experiment will cover two farrowing seasons.

Vitamin A.—The work during 1958-59 showed that pigs receiving adequate Vitamin A until three months of age would then grow on satisfactorily for the next three months if this source was removed; the pigs then being heavy enough for slaughter. If Vitamin A is not fed up to three months of age, depression in growth rate and less efficiency of feed conversion are liable.

Restriction of Feed Intake.—These trials were continued. Results showed that with the type of pig on this Farm—pure bred Tamworths—restriction of feed to 3½ lb./head/day, from 120 lb. live weight, had no effect on carcass quality or efficiency of feed conversion. No level below 3½ lb. has been tried. The 3½ lb. level is low enough for commercial acceptance.

Milk vs. Meal-Feeding Trials.—This has been the main project. It will continue for at least another twelve months. Results so far indicate much better growth rate and efficiency of feed conversion in the milk-fed pigs, compared to those fed all meal. The milk-fed pigs are also "glossier" in the coat and, at market weights, more attractive to the eye.

POULTRY NUTRITION RESEARCH—SEVEN HILLS STATION

Growth Limiting Factors in Chicken Diets.—The study of factors limiting the nutritive value of chicken diets has continued. Supply and availability of essential and semi-essential amino acids have been examined.

Supplementation with amino acids, lysine, tryptophane, glycine and arginine has been shown to produce no effect on gain or efficiency.

Methionine and cystine have been shown to be deficient in some diets.

These results have been applied to the formulation of practical diets, with excellent results. The best recommendation of 1954 has been subject of comparison with a diet recommended in February, 1959. Results for mixed-sex Leghorn chickens at 8 weeks of age are summarised in the following table. They indicate an improvement of 27 per cent. in gain and 14 per cent. in feed conversion ratio in five years.

Improvement in Chicken (White Leghorn) Diets as between 1954 and 1959

Diet	Recommendation		
	1954	1959	Least sig. diff. (1 per cent.)
Weight at 8 weeks	0.980 lb.	1.248 lb.	0.033 lb.
Feed Conversion Ratio	3.23 lb./lb.	2.77 lb./lb.	0.067 lb./lb.
Mortalities	13.12 per cent.	7.95 per cent.	4.5 per cent.

Growth Depressing Factor in Some Meatmeals.—A study of the growth depressing factor in some samples of meat-and-bone meal has revealed that the factor is inorganic and produced by oxidation. Addition of an antioxidant to the meatmeal during processing has prevented formation of the toxic factor. An attempt to identify the growth depressing factor is continuing.

It has been demonstrated that laying hens can receive growth depressing meatmeals without ill-effect.

Factors Affecting Variation in Quality of Meatmeals.—These are being studied. It has been shown that availability or supply of methionine, lysine or tryptophane are not involved.

Antibiotics in Chicken Diets—Ultimate Cessation of Growth Response.—Following almost 10 years' continuous feeding of penicillin in the main brooder house, it was found that this antibiotic no longer produced a growth response.

The antibiotics, terramycin, oleandomycin and penicillin were fed at several levels and it was noted that none produced a response. This suggests that the growth depressing organisms have been eliminated. Further study is proposed.

High Efficiency Diets for Layers.—Experiments are in progress to produce high efficiency diets for laying hens; so that advantage can be taken of cheap grains, and the industry made independent of variations in supply of mill offals.

Three high efficiency diets currently being tested are resulting in 10 per cent. more eggs per bird, with a reduced feed consumption.

Protein Requirements for Layers.—The effect of protein level on egg production is being re-evaluated. Pullets have been fed diets providing 13 per cent., 15 per cent. or 17 per cent. protein over two years, to determine any effect on egg production and egg quality.

Current results indicate that requirements lie between 13 and 15 per cent. protein.

Vitamin A Requirements of Layers.—Laying pullets have received levels of 1,500, 3,000 and 4,500 i.u. supplementary Vitamin A over the last two years, to determine the minimum Vitamin A requirements for egg production. Available results are still inconclusive.

Protein-Energy Relationships in Chicken Diets.—The effect of varying levels of protein and metabolisable energy in chicken diets, on growth and feed conversion to 12 weeks of age, is being investigated.

Levels of protein up to 25 per cent. in starting diets have been tested and found to produce very satisfactory early gains. Part of the gain is carried over by the chicken to market weight. Energy level has been found to be more important than gain, in determining feed conversion.

Nutritive Value of Fishmeals.—Fishmeal has been found to produce improved grain and feed conversion in chicken diets. The nature of this response has been investigated. It is primarily due to supply of extra methionine or some closely related nutrient.

POULTRY GENETICS—RESEARCH AT SEVEN HILLS STATION

Selection for Egg Production.—The major breeding programme—recurrent reciprocal selection—has been carried on. Production and multiplication of new lines for further testing within the two breeds, Leghorns and Australorps, are continuing.

After 8 years of this programme it appears that the major difficulty, viz., poor viability of the Australorp inbred lines, is limiting the amount of selection achieved.

An experiment involving 800 pullets, to determine the genetic correlation between pure and crossbred egg production, has been commenced. A sample of 15 Leghorn and 15 Australorp cockerels were each mated to five Leghorn and five Australorp pullets, to produce pure bred and crossbred half-sib groups. These will be production tested until March, 1960.

Selection for Growth Rate.—A flock of birds derived from Australorp x Crossbred matings has been established, and selected for dominant white, rapid feathering, and weight at six weeks of age.

Initial results were very unsatisfactory, due to the disrupting of balanced genetic systems within each parent breed.

Selection over two generations has increased the average weights to equal the weights of crossbred chickens.

Heritability of 10 week weights has been calculated; using 200 matings, involving 1,400 chickens; and estimated to be 50 per cent.—with confidence interval between 38 and 75 per cent.

Biochemical Variation and Heterosis.—A study of the greater susceptibility of Leghorns to calcium deficiency, by comparison with Australorps, has been commenced.

Genetical studies indicate that this difference in calcium metabolism is controlled by autosomal genes showing some interaction between the X chromosomes and environments. Further study is proposed.

A difference between Leghorns and Australorps in manganese requirements is also being investigated. Current results suggest that Australorps' greater requirement of manganese is sex linked.

EGG QUALITY RESEARCH—SEVEN HILLS STATION

Variation between Farms, as to Egg Quality.—Two surveys in conjunction with the N.S.W. Egg Marketing Board, of quality of eggs produced on sample farms, have indicated very wide variations in initial albumen quality and amount of storage decline in albumen quality.

Unsuccessful attempts have been made to correlate the quality of the eggs produced on each farm, with management practices. The only factor observed has been the origin of the pullets used, suggesting genetic effects.

Albumen Quality Decline and Shell Porosity.—The relationship between decline in albumen quality and porosity of the shell, measured by the dye penetration method of Almquist, has been studied. The correlation between these characters is relatively low, and has not been found to be greatly altered by storage time.

Other measures of permeability of the shell are being investigated.

BEEF CATTLE RESEARCH—FROM LEETON EXPERIMENT FARM

There is further reference to Leeton Experiment Farm Beef Cattle research in the "Beef Cattle, Horses and Goats" section of this report of the Division of Animal Industry.

Selection on Production Characters.—Projects for selection of the beef breeding herd on production characters were commenced in 1956, when the Special Veterinary Officer (Beef Cattle Research) based on Leeton Experiment Farm established two demonstrations at Bombala, on the Monaro tablelands. A third demonstration has been established at Newbridge.

The whole programme centres around the use of the two portable cattle weighing scales.

Productivity of the beef breeding herd can be increased through selection for factors of economic importance. Those which should receive greatest attention under Australian conditions are fertility, mothering ability (weaning weight of calf), rate of growth, and conformation.

Rate of Growth Progeny.—This is one of the most important of the selection factors. It can be approached from two angles; firstly through the cow herd, secondly through the sire.

Production of a heavy, top quality calf at weaning every year is the main function of the beef breeding cow. Ability to do this varies tremendously with any herd. Accordingly, herein is a practicable means of selection whereby production and financial returns can be lifted.

Crux of the programme is comparison of the mothering ability of each cow, measured by the weight and grade (conformation and quality) of the calf at weaning time. The cows with poor calves are culled.

To make a fair comparison of calf weights it is necessary to adjust the weight of each calf to what it would have been if the calf had been a steer, reared by a mature cow, and weaned at a constant age.

The work in these projects has included some 400 calf/cow comparisons each year. This has given some base information on the corrections or adjustments necessary. These have varied from herd to herd and from year to year. However, the following should have wide application:—

Age of calf at weaning: For each day of age a calf is under or above the standard age add or subtract approximately 1.5 lb.

Age of dam: Calves from 3 years old dams are about 40 lb. lighter than calves from mature (5 to 9 years old) dams.

Sex: Heifers are about 25 lb. lighter than steers.

It has been shown overseas that the repeatability of weaning weight is high. This implies that once a cow has demonstrated her ability to wean a heavy or a light calf she will continue to do so throughout her productive life. This is now being confirmed and demonstrated locally.

Pregnancy Diagnosis.—This also has been undertaken in the projects. The annual turn-off from a breeding herd depends on the number of calves dropped. If a property can only winter-through, say, 100 breeders, then they should be 100 pregnant breeders.

Pregnancy diagnosis in the project herds has eliminated the empty-cow problem, and the calf drop is in the vicinity of 100 per cent.

Routine pregnancy-diagnosis is not only of value in directly increasing production. It must be an integral part of the herd improvement programme, since it ensures a maximum number of calf/cow comparisons each year.

It may find its greatest value when selecting replacement heifers. By mating more than are required for normal replacements each year, the empty ones can be disposed of before the winter. The remainder go on to demonstrate their mothering ability. This procedure is now part of the overall programme of herd improvement in these project herds.

Progeny and Production Testing of Bulls.—This is the second aspect in selection for rate of growth mentioned earlier. Generally, the rate of gain made subsequent to weaning is the best indication of a bull's inherent capacity to grow, and therefore indicative of his ability as a sire of fast growing progeny.

At Bombala, bull calves from cows previously proved to be top producers are kept. These youngsters are reared under identical conditions and are weighed regularly, up to 15 to 20 months' of age. Those which make best live-weight gains are used as the future sires, providing they are also good type.

To demonstrate the value of this approach, the co-operator pastoralist in the Bombala project had been prepared to mate to a random group of heifers some fast growing and some slow growing bulls. The Department has now located the offspring of these matings at Cowra Experiment Farm; to follow through their growth rate, and demonstrate the value of selection of herd sires on the basis of their own growth rate.

Extension Value.—Results from the foregoing beef cattle projects, to date, have formed the basis of articles, radio broadcasts and field days. Wide interest has been shown in this work. Graziers have come considerable distances to see the projects and discuss application in their own herds. The principles being demonstrated appeal to the reason of many progressive cattlemen. Some of the latter have started to apply the principles. The Department is co-operating with them, and has also applied the principles in many Departmental herds.

At the Beef Cattle Technical Sub-Committee meetings held in Queensland during August, 1958, the representative of this Department reported results of the work. The results were of considerable interest to delegates from the various States and representatives of the Commonwealth Department of Primary Industry.

During the year a new and improved Production Record Card has been printed.

BEEF CATTLE NUTRITION RESEARCH—LEETON EXPERIMENT FARM

Expansion of beef cattle investigations at Leeton Experiment Farm has occurred by virtue of:—(a) increased stock management facilities—such as subdivisional fencing, watering facilities and pasture production; (b) additional staff—another Livestock Officer (Beef Cattle); (c) increased stock numbers for experimental purposes.

The main investigations have been as summarised in the following paragraphs.

Hay Supplementation of Pasture.—The aim of this study was to ascertain the effect of providing hay to beef cattle grazing lush irrigated pastures. The experiment commenced on 10th October, 1958, with yearling Aberdeen-Angus heifers averaging 426 lb. liveweight, and ran for 201 days. The

heifers were run in three groups—(i) on lush pasture alone—control; (ii) on lush pasture, plus long pasture hay; (iii) on lush pasture, plus milled pasture hay.

Hay was available throughout, at 5 lb. per head/day. Stock were rotationally grazed to ensure full pasture feeding; the paddocks divided with electric fencing.

Tabulation of Results—from the 201 Days Run

	Overall Liveweight Gain		Hay Fed per Head		Stock Values per Head
	(lb.)	(lb./day)	Weight (tons)	Cost*	
Control	198	0.99		£ s. d.	£ s. d.
Long Hay	251	1.25	0.34	2 0 9	35 0 0
Milled Hay	246	1.23	0.36	2 17 7	36 15 0

* Hay valued at £6 per ton plus £2 per ton for hammer-milling.

Observations and comments are summarised, as follows:—

- (1) Hay feeding resulted in an increase of liveweight gain, of approximately 50 lb., during the 201 days; with greatest response during the first 60-80 days.
- (2) Daily hay intake frequently was below the 5 lb. offered—mainly in the Spring and early Summer. This could not be related to moisture content of pasture. However, it may be related to fibre content of pasture. This possibility is being examined.
- (3) The added stock value would not pay for the quantity of hay fed during the full 201 days of the present experiment (labour costs of feeding out are not included). However, it was interesting that the greatest daily liveweight increase and lower hay consumption were both recorded in the Spring.
- (4) There was evidence of a pasture-saving effect in the two hay-fed groups.
- (5) No difference in animal response was found between the long and the milled hay groups. However, the milled hay was readily consumed with a minimum of wastage; whereas there was a noticeable wastage of long hay. This wastage was reduced with the new hay feeding rack.

Early Weaning of Beef Calves.—This study aimed to ascertain the effect of early weaning on the calf's development, and whether comparable weaners can still be produced.

Twenty-seven calves in the experimental stud herd of Aberdeen-Angus were ranked on age, within sexes, into three groups. Weaning was at 4, 6, and 9 months. The following table presents results, with weights adjusted for age and both sexes and averaged:—

Group	Weight per Day of Age (lb.)	Weight at 9 months (lb.)	Stock Values per Head (£)
Weaned at—			
9 months	2.01	543	32
6 months	1.78	481	27
4 months	1.66	448	25

The differences show that the calves should be left on the cows, for maximum weight gains. However, bloom and finish of calves were not greatly affected by early weaning.

Lower price for the earlier weaned animals may well be more than offset by increased numbers which a farmer could carry.

It is well recognised that the beef breeding cow is an inefficient converter of pasture into veal meat. Dams of the early weaned calves were relegated to a low plane of nutrition. In addition to controlling their condition, a saving of good quality pasture was effected.

Carcass measurements are being taken at slaughter. Body measurements have been taken throughout.

Milk Production and Consumption in Beef Cattle.—The aims were to study milk production of the beef breeding cow, and to assess its importance in calf growth.

Calves were separated from their dams over a 36-hour period. Milk consumption was estimated for 24 hours at two sucklings. Weights before and after suckling were used.

Particularly during early lactation the young calf could not consume all milk available. Nevertheless the lactation curve showed a slight rise during the first 80 days, to 11.5 lb. per head per day. It then fell, to 6 lb. per head per day at 300 days.

Considerable individual variation was apparent. With further data it may be possible to show a relation between milk production and calf performance.

Hormone Implantation Effect on Growth and Carcase Characteristics in Steers.—The third hormone implantation experiment was concluded with Group F steers. 60 mgms of hexoestrol was implanted into half of a low plane group and half of a high plane group. The experiment ran for 18 weeks. Then the steers were slaughtered at Wagga Municipal Abattoir. Carcase appraisal was undertaken, including dissection of rib cuts.

The table presents the *change* due to treatment, in both low and high plane groups:—

Factor	Plane of Nutrition	
	Low	High
Liveweight gain (lb./day)	+ 0.1	+ 0.2
Total liveweight gain (lb.)	+ 13	+ 31
Carcase weight (lb.)	+ 10	+ 17
Eye muscle depth (per cent. increase)	+ 2	+ 6
Eye muscle area (per cent. increase)	+ 1	+ 9
Fat Depth (per cent. increase)	— 8	— 26

These weight increases and carcase changes are of lower magnitude than recorded in 1957-58. However, there is evidence that a high level of nutrition is required for best response to treatment.

A fourth hormone implantation experiment is in progress. At 22 weeks after treatment the implanted group had gained 83 lb. extra liveweight, or 0.6 lb. per head per day. These groups were valued by butchers and agents. Treated animals were considered to be worth £4 10s. 0d. more. Evaluation will be repeated before slaughter.

Teeth Eruption, and Decreased Growth Rate.—The time of eruption of permanent central incisor teeth is being recorded. There is some evidence that this period is associated with a decreased growth rate in young cattle. This could be a factor in early marketing of baby beef.

Production per Acre.—This experiment aims to examine the production per acre of commercial animal products (meat and wool) with both sheep and cattle run independently. Initially, the stocking rates are to be varied. The stock are to be confined to self-contained areas; to enable a truer assessment of actual pasture productivity than has been possible in the past.

The cattle were run on the summer pasture areas during part of the summer but owing to watering difficulties this was not continuous. Facilities and pasture are ready for this experiment to start on the new basis in August, 1959.

Apiculture Section

GENERAL

Staff.—Staff establishment comprised five Livestock Officers (Apiculture).

Work Trends.—In-person and telephone requests for service are increasing; and new developments—associated with systematic pollination of various crops, and the effect of insecticides on bees—are in part accounting for the increase.

A lot of the work is of a regulatory nature, to prevent spread of serious bee diseases and pests; and also to assist local apiarists to comply with requirements for health certificates when forwarding bees, honey, etc., to other States or overseas.

Honey Industry Production.—Honey production in northern New South Wales was very low during late Winter, Spring and Summer. A remarkable improvement occurred in the Autumn, with the flowering of silver leaf ironbark, lucerne and river red gum. The best crops of the season were gathered from Caley's ironbark. This provides one of the most choice honeys in the Commonwealth.

On the north coast the season was generally poor, with some extractions from white clover and grey ironbark.

Central-west production was below average in the period between June and December, 1958, but improved later; with good crops from Mugga ironbark, corky ironbark, lucerne, St. Barnaby thistle, and mallee.

Central coast production was negligible; only small crops were taken, from certain ironbarks.

South-west yields were poor until the Autumn; with only a few satisfactory crops in the preceding Spring from Pater-son's Curse in the Murrumbidgee Valley. Since Autumn there has been an improvement; particularly with the flowering of grey box and Mugga ironbark. Many southern beekeepers have migrated their hives into Victoria. South coast crops were good in the late Winter, 1958, but the dry Spring caused failure of the grey ironbark; and most commercial beekeepers moved their hives from the area. Very little honey has been obtained there since Spring, 1958.

Honey Marketing.—Overseas the demand for honey has been weak, and prices correspondingly low. Until late Summer a good demand for choice quality honey existed on the local market but, due to accumulated stocks, the demand has weakened. Honey exported has realised 8d. to 9d. per lb. to the beekeeper. The home market has been maintained at 16d. maximum per lb. for choice grades.

REGULATORY SERVICES

American Foul Brood.—Widespread outbreaks occurred, throughout the State, and were dealt with by departmental apiary officers. With one exception, the outbreaks were brought under control before heavy losses occurred.

Nearly all beekeepers are now familiar with the symptoms of the disease, and most realise that the disease can be eradicated quickly—by prompt removal of all infected material and thorough, regular examination of the brood combs of other hives for the presence of further infections.

Nosema Disease.—This took heavy toll of adult bees during the early Spring along the south coast, where the bees were working the spotted gum honey flow. With advent of drier conditions, the incidence of the disease declined to a level where it caused no apparent losses.

Sac Brood.—Incidence was extremely low; because conditions did not favour development of Darling Pea.

Importation of Queen Bees from Overseas.—With the development of a hybrid bee project by the largest commercial beekeeping organisation in the U.S.A., and the sale of queen bees by prominent United States breeders, the number of queen bees being received from America has increased. Queen bees are also received from other countries, particularly Italy, Yugoslavia and New Zealand.

Because Australia is free of certain serious bee diseases that exist mainly in Europe, close adherence to certain regulations is essential. This has necessitated the provision, by Apiary officers, of new cages and fresh escorts for all queen bees received from overseas, and examination of the original escorts by Veterinary Officers (quarantine service) to detect whether or not disease is present.

BEE RESEARCH NEED

Bee Research Society Formed.—Departmental officers worked in close co-operation with the executive members of this new society.

Research into many beekeeping problems peculiar to Australia is an urgent need. There is no one engaged solely in apicultural research in the Commonwealth of Australia.

The Principal Apicultural Research Officer with the New Zealand Department of Agriculture, Mr. T. Palmer-Jones, visited New South Wales and had discussions with departmental officers and prominent apiarists.

DEPARTMENTAL APIARIES

Apiaries are located at Hawkesbury Agricultural College, Wagga Agricultural College, Tamworth Agricultural Experiment Station, Bathurst Experiment Farm, Grafton Experiment Farm and New England Experiment Farm.

Bee Breeding at Hawkesbury Agricultural College.—In the bee breeding work at Hawkesbury College instrumental insemination is used.

Satisfactory progress has been made with inbreeding. Several inbred lines have been developed. These will be used next season for crossing, and the products will be compared with existing strains.

Queen Bee Sales.—There was a keen demand for queen bees and many were sold to apiarists.

Hives Moved to Bathurst.—Most of the honey producing hives were moved from Hawkesbury College to Bathurst Experiment Farm late in the Spring. They provided honey for the College kitchen and also ensured ample winter stores for the bees. Combs of honey were brought back to the College and distributed to queen rearing nuclei as required.

The increase in student accommodation at Wagga Agricultural College and the building of a new roadway has encroached on the College apiary and has necessitated the provision of a new site and building. Plans have been prepared for a new honey house which is urgently required for student instruction and apiary management.

Tamworth Experiment Station Apiary.—Good progress has been made in establishing an apiary. It was made possible by purchase of new hive equipment which has been assembled by the farm staff with supervision and help from the Tamworth District Livestock Officer (Apiculture).

Bathurst Experiment Farm Apiary.—The hives were attended to by the Bathurst District Livestock Officer (Apiculture); and hives temporarily migrated from Hawkesbury Agricultural College were located in an adjoining area. They produced a surplus, utilised at Hawkesbury Agricultural College.

Extension Service in Apiculture

Field Days.—Apiary officers conducted Field Days with the Beekeepers' Associations and branches of the Agricultural Bureau.

Summer School.—A successful Summer School in Apiculture was held at Hawkesbury Agricultural College and a full complement attended.

Press and Radio.—Articles were prepared for the *Agricultural Gazette* of N.S.W. and beekeepers' journals, as well as for newspapers and radio stations.

Hand Book "Bees and Honey."—This has been revised and the new edition is in the hands of the printer. Four chapters have been replaced. Most of the photographs also have been replaced. Major alterations were made to some chapters, and minor ones were needed in others to bring the book up to date.

Reprint of "The Honey and Pollen Flora of New South Wales."—The reprint has been received from the Government Printer.

Co-operation with Producer Associations, and Show Societies.—Officers of the Apiary Branch judged at the Royal Agricultural Society's Show, Sydney, and a number of country shows. Officers also attended Agricultural Bureau and Junior Farmer meetings and Conferences, meetings of Beekeepers' Associations, and kindred occasions for group extension activities.

Liaison with Other States.—The Principal Livestock Officer (Apiculture) attended the Annual Conference of the Queensland Beekeepers' Association. Close co-operation existed between N.S.W. apicultural officers and officers of the Apiary Branches of Departments in other States. There is considerable movement of bees interstate, and the liaison is most desirable.

Liaison with Other Authorities in N.S.W.—The Branch co-operated with officers of the N.S.W. Departments of Education, Technical Education, and Health, the N.S.W. Forestry Commission and the Commonwealth Bureau of Census and Statistics, in respect to various matters.

American Professor's Visit.—Dr. E. J. Dyce, Professor of Apiculture at Cornell University, U.S.A., and a leading authority on the packing and marketing of honey, spent three months in Australia—mostly in New South Wales. His itinerary was prepared by the Principal Livestock Officer (Apiculture).

As a result of Professor Dyce's visits to the principal honey packing and distributing bodies, the important beekeeping centres and field days conducted by various Apiarist Associations, the industry gained a lot of useful knowledge.

Professor Dyce is the third prominent apiculturalist from U.S.A. to visit N.S.W. in the past three years.

Beef Cattle, Horses and Goats Section

GENERAL

Staff.—The Section has an establishment of ten Livestock Officers. There was a nett gain of three this year; from four appointments and one resignation.

EXTENSION ACTIVITIES

Fat Stock and Carcass Competitions.—Although beef carcass competitions were not held at some of the country killing centres where customarily they have been annual events, officers of the Section officiated as judges at several such competitions throughout the State. This phase of beef cattle work promises to figure prominently in the Section's work in the future; due to increasing interest in the importance of carcass quality (i) in itself and (ii) as an aid to selection of breeding stock.

Beef Cattle Breeders Competition.—For the seventh successive year this competition has maintained its popularity and useful purpose. Increased entries, numbering 147, were received on this occasion. Because of the many field days associated with judgments the competition has a big impact on extension service. The competition serves an important purpose also as an initial training ground for young livestock officers, in beef cattle judging; and gives them confidence in meeting the public and in demonstrating.

District Advisory Work.—The posting of a Livestock Officer (Beef Cattle, etc.), to the Western Agricultural Region (Orange headquarters) has proved most successful. Heavy demands have been made on this officer for his advisory services within the Western and Mid-Western Regions, and from other parts of the State. This is evidence of the great need for field service to this livestock industry. The initial officer has established a high standard for those who are in in-service training to follow him in this line of work.

Group Extension.—Officers of the Beef Cattle Section have participated in Beef Cattle and Animal Husbandry conventions and in conferences and meetings at Inverell, Marulan, Ando, Goulburn, Quandialla, Muswellbrook, Gunnedah, Casino, Narrabri, Hawkesbury Agricultural College, Trundle, Purlawugh, Pilliga, Merah North, Eurimbla, Orange, Coonamble, and Baradine. They also contributed at the Animal Husbandry School for Departmental officers, held at Yanco Experiment Farm.

Mass Media.—Wide use has been made of radio and the press for extension purposes.

Interstate Liaison.—The Principal Livestock Officer (Beef Cattle, etc.), made an inspection tour of beef cattle properties in parts of the Northern Territory and the Kimberleys. He also officiated as Judge of the Arab Horse Section at the 1958 Royal Show, Melbourne.

BEEF CATTLE RESEARCH

At Leeton Experiment Farm.—Under the supervision of the Special Veterinary Research Officer (Beef Cattle) the following research projects are in progress:—

Production per acre as measured by body weight fluctuations in varying proportions of grazing beef cattle and sheep;

Early weaning of Angus calves;

Long hay V milled hay for beef cattle;

Effects of Hexoestrol on growing and fattening beef cattle;

An account of them occurs (on page 73) under "Beef Cattle Nutrition Research—Leeton Experiment Farm".

Beef Cattle Improvement Based on Grade and Rate of Gain of Calves.—The investigation (Project 108 under the Agricultural Extension Grant) has been extended to a third property in the Newbridge district; meanwhile continuing on two properties in Bombala district.

Parallel investigations have been extended to Departmental beef breeding herds at Leeton, Wagga, Trangie and Duck Creek and to another private property in the Canowindra district.

Investigations at Belabula Farm, Canowindra, were continued for a third year, into the effects of hexoestrol on growing and fattening steers.

STUD BEEF CATTLE

There were 411 in the Department's beef studs at the end of May, 1959, an increase of twelve during the year.

Stud Angus Cattle.—These are located at Trangie Agricultural Experiment Station, Duck Creek sub-station of Wollongbar Experiment Farm, and Leeton Experiment Farm. The main stud is at Trangie. The breeding units at Wollongbar and Leeton are mainly concerned with investigational work at the latter Farm.

The last imported Angus bull, "Pro Ben of Balfrom", has bred up to expectations at Trangie. The first of his male progeny were exhibited and offered for sale at the 1959 Royal Show, Sydney, with pleasing results; but the best of this bull's performance has yet to be seen. His influence on the female section of the Trangie Stud has been marked; and outside opinion is that the Trangie females as a group are equal to anything in New South Wales.

Stud Sales.—Thirteen bulls and fifteen females were sold from Trangie; twelve bulls and one female from Grafton; one bull from Leeton; the last two females from Hawkesbury Agricultural College Stud; also six surplus females from Wollongbar. Total revenue from these sales was £4,964 19s. 6d.

Selection.—Selection with the Department's stud beef animals is based on rate of gain and grade of young stock, and fecundity and fertility of breeding stock.

Show Exhibits of Angus.—Six bulls were exhibited at the 1959 Royal Show, Sydney, and these gained a third and a fourth prize. All were sold by public auction, for a total of 1,960 guineas (top price, 650 guineas).

Poll Shorthorn Stud.—Operations of the Poll Shorthorn Stud, at Wagga Agricultural College, were greatly restricted by the death of imported bull "Birmingham Nugget 3rd". He developed Johne's disease and was destroyed and the Stud was quarantined—for one year from 12th October, 1958.

The loss of this bull is a serious blow to the Poll Shorthorn breed in Australia, as the quality of his progeny was exceptionally good.

Quarantine restrictions having prevented disposal of young bulls, the number in the stud has increased. Before quarantine restrictions were imposed, one bull was sold from the Stud. Two additional Shorthorn heifers were bought for the Stud.

Poll Shorthorn Show Exhibit.—A small exhibit of Poll Shorthorns was entered in the Wagga Show. The young bull "Kyeamba Nugget", a son of "Birmingham Nugget 3rd" (imp.) was judged Champion of his breed.

Poll Hereford Stud.—This Stud, at Hawkesbury Agricultural College, is in its formative stages.

Commercial Beef Cattle.—Non-pedigree beef cattle are maintained at various centres; for investigational purposes, and as ration cattle for the Agricultural Colleges. Surplus cattle were sold, numbering 102 head.

For commercial cattle purposes, sets of cattle yards have been constructed at Tamworth Agricultural Experiment Station and at Cowra Experiment Farm.

At Cowra Experiment Farm a line of steers is being held on agistment. These steers are connected with a beef cattle research project being pursued on a property in Bombala district. Drought conditions prevail in that area and, to keep the investigations "alive", up to 300 tons of hay is in supply to the co-operating property owner—in addition to this line of steers having been accepted on agistment.

The Special Veterinary Officer (Beef Cattle) with headquarters at Leeton Experiment Farm is supervising the foregoing range of research projects.

HORSES

Horse Numbers.—Since the end of World War II the total of horses at Departmental institutions has been declining and is continuing to do so.

The total was 235 at the end of May, 1959. The reduction was only five in the past year, and this was due to the closing down of the Clydesdale stud at Hawkesbury Agricultural College and the sale of several of the old stud mares.

Arab Breeding.—The only horse breeding now being done by the Department is in the Arab Stud, which is divided between Hawkesbury and Wagga Agricultural Colleges.

Three Arab mares from Wagga were sent for service in 1958 to an imported grey stallion, "Electric Silver", owned by a Victorian breeder.

Service of Privately Owned Mares.—The policy regarding service of privately owned mares by the Department's stallions has been changed. Only purebred registered Arab mares are now accepted for service. This has greatly reduced the numbers of mares being received for service.

Arab Exhibits at Shows.—Nine Arab horses were exhibited at the 1959 Royal Show, Sydney. The awards they won comprised:—Champion Arab mare and Wentworth Memorial Trophy for the best Arab mare; one 1st and three 2nd prizes.

Arab Sales.—Two Arab colts were sold, each for 200 guineas; and one Arab filly was sold for 110 guineas.

SAANEN GOATS

Condoblin Experiment Farm Stud.—The quality and productivity of the Saanen goats continue to improve. There were seventy-nine in the Stud at the end of May, 1959.

Death of the recently imported buck "Mostyn Marcel", after having sired only one lot of kids, was a severe blow to the Stud. Fortunately doe kids were in excess of buck kids; and there are many females to select from, to maintain his influence in the Stud.

Outstanding Production Performance.—The doe "State Idol" yielded 5,595 lb. milk under official test in 365 days. This is an Australian record. More significant, however, is the production average of the milking herd. The herd's production figures in the tenth month of lactation showed an average of almost half a gallon of milk per doe per day.

Service to Privately-owned Does.—Demand for the services of bucks in the Stud, on privately owned does, is improving. Two Sydney Studs sent does to the bucks at Condoblin this year. Twenty-four does were accepted, served, and returned to their owners during the current year.

Show Exhibits.—Fourteen does were exhibited at the 1959 Royal Show, Sydney. Between them they won approximately 75 per cent. of the prizes in the Goat Section. Their awards comprised:—three Championships; two Reserve Championships; three Special prizes; 13 First prizes; 10 Second prizes; five Third prizes; and one Commended.

Piggery Section

GENERAL

Staff.—The establishment strength is twelve Livestock Officers (Pig). All positions are occupied. Four new appointments and three losses occurred this year.

Pig Industry Trends.—The 1957-58 drought forced many pig-raisers to abandon pig-raising or reduce the size of their herds, especially in the grain-growing areas. The resultant heavy marketing depressed pig prices. This led to a shortage of pigs. Following the familiar pattern, keen competition for available supply later caused prices to rise. At present they are sufficiently profitable to encourage farmers to resume pig-raising on a scale at least equal to that of 1956-57.

Department of Agriculture Herds.—The pig herds at Hawkesbury and Wagga Agricultural Colleges, and Wollongbar and Grafton Experiment Farms, were again used for instructional and research work. Investigations into nutritional problems were continued as the main line of research.

Stud pigs were also supplied to farmers.

EXTENSION AND REGULATORY SERVICES

Activities of Livestock Officers (Pig) in carrying out extension and regulatory duties are summarised in the following table.

	1956-57	1957-58	1958-59
Farms visited	1,144	975	1,301
Meetings attended	51	60	55
Pigs sales attended	110	81	111
Field Days attended	45	47	36
Bacon Factories visited ..	45	29	48
Experiment Farms visited ..	59	68	56
Shows attended	32	27	38
Lectures and demonstrations given	92	81	111
Stock Foods Act Inspections	—	17	—
Broadcasts	44	59	49
Inspections under Swine Branding Act, 1940 ..	77	26	34

Press.—Numerous press articles were prepared and released to daily and weekly newspapers, and articles were prepared for journals.

Pig-raisers School.—The Annual School of Instruction for Pig-raisers was again held at Hawkesbury College. It was attended by farmers from many parts of the State.

Assistance to Other Departments.—Regular inspections of Pig herds at institutions under the control of the Departments of Prisons, Health, and Education were made. Assistance was given in general herd management. It is estimated that the gross annual return from sale of pigs from Government-owned herds now approaches £90,000.

Group Advice.—Technical advice was also furnished to various farmer organisations, the Junior Farmers Movement, the Australian Pig Society, the Royal Agricultural Society, numerous country Show Societies, and the Australian Meat Board.

Show Teams.—Pigs from Wagga Agricultural College and Grafton Experiment Farm were exhibited at local shows with outstanding success. Awards were won also in a State-wide carcass competition.

Show Judging.—Livestock Officers (Pig) served as judges and stewards at the Royal Show, Sydney, and many country Shows.

Swine Compensation Act and Swine Branding Act.—The compulsory branding of pigs prior to sale or slaughter continued to yield spectacular reduction in disease incidence, particularly tuberculosis. The consequent reduction in claims for compensation led to the credit balance in the Swine Compensation Fund exceeding £100,000 for the first time since the Fund was created. The Fund was actually in debt to the Treasury prior to the introduction of the Swine Branding Act, in 1955.

Poultry Section

Production Trends.—Egg production for the year declined by approximately 5 per cent. In the first half of the year the decline was due to increased cost of feed. Later, because of the successful wheat harvest, and heavy supplies of other grain, notably grain sorghum, feeding costs were markedly reduced. Accordingly, production increased in the later months, particularly in country centres.

N.S.W. Poultry Improvement Plan (Eggs).—Operation of the Plan continued; with five additional breeders participating, making a total of 22 breeders.

Many of the established breeders have increased their facilities, to widen the scope of testing, and several hatchery groups were formed to enable greater intensity of selection. Some breeders are working to improve two separate breeds, with a view to general upgrading of quality in crossbred progeny for sale to egg producers.

Egg Laying Competitions.—Egg production from the winning Australorp team of six hens was 1,472 eggs in 357 days; the highest for eight years. The three sections of the Competition and a Random Sample Test comprising 18 entries were continued.

Broiler Test.—This test was initiated, but was abandoned due to lack of entries. Production of specialised broiler strains is in its infancy and the majority of breeders at present produce these lines only during the off season—late summer and autumn.

Demonstration Projects—Agricultural Extension Grant.—Current demonstrations were continued, and arrangements made for a new demonstration in Tamworth area—relating to optimum stocking rates for layers.

Field Extension Services.—Four livestock officers were engaged in district extension duties—in Cumberland, Parramatta-Gosford, Tamworth and Wagga areas. Their work included farm visits, preparation of poultry literature and press articles, radio broadcasts, and participation at field days.

The following figures, based only on the Cumberland and Parramatta-Gosford officers' returns give an indication of the district officers' duties:—

	1957-58	1958-59
Visits to private farms	1,133	951
Number of Stock culled	45,000	50,000
Breeding Stock selected	4,000	5,000
Visits to Government Institutions	20	19
Field Days	10	8
Visits to Departmental Farms	30	21
Judging at Shows	4	6
Poultry Schools	3	2

In addition they prepared press articles and radio talks, and accompanied interstate and overseas visitors, including Colombo Plan and F.A.O. Fellows, and final year veterinary students, on farm visits. They participated also in the conduct of Random Sample Tests, Breeders' Tests, and veterinary experiments, and purchase and collection of stock.

Staff of the Poultry Experiment Station, Seven Hills, also took part in extension through visits to farms, hatcheries, and manufacturers, and by lectures at field days and at meetings arranged by various rural organisations.

A successful major Field Day was held at the Seven Hills Experiment Station in February, 1959; more than 500 people attended. This Field Day was arranged to acquaint the public with research procedures adopted at the Station and the current projects.

Nine students of the Faculty of Veterinary Science, University of Sydney attended the Station for practical training and one Burmese student under the Colombo Plan attended.

Representation at World Poultry Science Congress.—The Principal Livestock Officer (Poultry) visited the U.S.A. to study the poultry industry in that country, with particular reference to methods employed in retention of egg quality. He also attended the 11th World Poultry Congress, held in Mexico City.

Research for the Poultry Industry.—See earlier heading in this report of the Animal Industry Division, relative to work proceeding at the Poultry Experiment Station, Seven Hills.

Sheep and Wool Section

Staff.—Establishment of the Section has been increased by one, from twenty-six to twenty-seven. The additional position created was for a Livestock Officer (Sheep and Wool) at Cowra, within the Mid-Western Region. This position, together with the previously approved position of Livestock Officer (Sheep and Wool), Cooma, was filled in April, 1959.

Mr. L. H. Beveridge, Livestock Officer (Sheep and Wool), Dubbo, retired on the 23rd June, 1959, after thirty-five years' service in the Sheep and Wool Section of the Department. Appreciation of Mr. Beveridge's long and loyal service is recorded.

Extension Work.—There has been a marked increase in the amount of extension work carried out.

Visits to properties increased by 14 per cent., the number of sheep classed increased by 8.5 per cent., and the total of lectures, field days and demonstrations increased by 34 per cent.

Radio broadcasts and publicity statements increased by 34 per cent and officers' attendances at Agricultural Shows and Ram Sales increased by 7 per cent.

A decrease of 5 per cent. in the value of stock purchased on behalf of breeders was mainly due to the decline in Sheep values.

Telephone, written and personal inquiries for advice on management and husbandry problems increased remarkably in volume. This demand has been met without restricting officers' other extension duties.

Summary of the major extension activities of District Livestock Officers (Sheep and Wool). A comparison of years 1957-58 and 1958-59:—

Field Officers' Major Activities, in Summary	1957-58	1958-59	Percentage Increase or Decrease
Number of properties visited	2,101	2,402	+ 14.3
Number of sheep classed	268,271	290,892	+ 8.5
Value of ewes and rams selected for breeders	£83,951	£79,081	— 5.0
Lectures, Demonstrations, Field Days	189	253	+ 33.8
Ram Sales, Agricultural Shows attended	87	93	+ 6.9
Radio broadcasts, publicity statements	193	260	+ 34.6

The staffing of Cooma and Cowra districts in April, 1959, did not have a significant effect on the above figures as the reports of District Livestock Officers (Sheep and Wool) cover the period up to 31st May.

The "Merino Ewe Competition"—This competition, conducted by the Department in conjunction with "Country Life" Newspaper again had record entries, with strongest support from the southern tablelands.

The competition has always been a very effective extension medium, but its extension value has been increased by covering a wider field at Field Days held in association with the judging of finalists.

Preparations are being made to develop the Field Days on the lines of "Animal Husbandry and Production" Field Days, rather than confine them as at present to the subject of wool production.

Interest shown by breeders during local judgments has further increased. These judgments have brought many producers into contact with Livestock Officers (Sheep and Wool), and this widened the latter's extension opportunities.

Lamb Breeders' Ewe Competition.—This competition, conducted by the Department in collaboration with the Rural Bank, has been continued. It has achieved a great deal in spreading more efficient production. Contacts between producers and District Livestock Officers (Sheep and Wool) have been increased by it.

District Competitions.—These, of various kinds, have been carried out by District Livestock Officers (Sheep and Wool). They include local Merino Ewe Competitions, Hogget Competitions, Lamb Competitions and Carcass Competitions.

Close liaison has been maintained with branches of the Agricultural Bureau and other primary producers' associations in the organisation and conduct of competitions as media of individual and group extension.

In-Service Schools.—Officers of the Section attended a Sheep and Wool Refresher School at Trangie Agricultural Experiment Station, where the merino breeding programme was studied in detail. Similar schools are in mind, to deal fully with the Shannon Vale management and nutrition work, the lamb production field, the marketing and processing of wool and current research of the C.S.I.R.O. and Universities.

Other schools attended by individuals from the Section were an Irrigation School at Wee Waa, an Irrigation School at Yanco, an Extension Methods School at Newport; also a C.S.I.R.O. Liaison Tour.

Production Trends.—As a direct result of lower wool prices there has been a definite trend towards increased lamb production.

Mating of cast-for-age Merino and Corriedale ewes, to long wool and Down type sires, has increased in many of the slopes and tableland areas.

Increased numbers of Merino ewes were mated to Border Leicester rams in the inner western district. Merino breeders have undertaken lamb raising as a supplementary enterprise and to increase their nett return. This increase in the number of Merino ewes mated to Border Leicester rams will result in more first cross ewes becoming available for lamb production in the more favoured environments.

In the New England district, particularly, the increase in lamb production in conjunction with wool growing has been marked. The increase has been marketed mainly in Brisbane.

Trend in Types of Wool.—In a number of districts there has been evidence of a swing from fine and superfine wool production to the more bulky medium wool type. Wool values have been such that the broader and bulkier types have been more profitable to the grower.

Management.—The fall in wool and lamb prices have directed the attention of many owners to critical examination of their cost structure and production methods. There has been an increasing awareness of the need to attain greater and more economic production by better use of pasture and animal resources.

Autumn Shearing Trend.—There has been wider adoption of autumn shearing in many districts. In the central and southern tablelands the autumn shearing has been adopted as an alternative to pre-lambing shearing.

Ewes lambing in the spring, when approaching full wool, have always been a prolific source of lamb and ewe mortalities. A change to autumn shearing has simplified husbandry and management problems and resulted in appreciably lower mortalities. Owners who have adopted this practice are so satisfied with the results that their experiences will quickly lead to its more widespread adoption.

The mechanics of the change from spring to autumn shearing varies according to the requirements of different properties. In some cases the change is achieved gradually, by extending the shearing date over two or three years. In other cases, autumn shearing is adopted with all replacement stock, and in a few cases the change has been effected in one year.

The increased autumn shearing also has the advantage of spreading the shearing season. Thus making more effective use of shearing labour, and easing the pressure on wool storage, handling and selling facilities.

Spring Lambing Trend.—The number of properties adopting spring lambing in preference to the old-established practice of autumn lambing has increased. Where climatic and pasture conditions allow, spring lambing allows exploitation of ewe fertility, and a close fit of animal demands to the pasture production pattern.

Mules Operation Increasing.—The Mules Operation, less used when the chlorinated hydrocarbons were effective, has become more widely adopted as a major method of control of fly strike.

Early Weaning Increasing.—Early weaning has become more widely accepted; to simplify management, and achieve more effective use of pastures.

Fodder Conservation Trends.—Following the serious depletion of fodder resources during the 1957-58 drought there was a concerted effort to restore sheep fodder reserves to a safe level. Oat grain, cereal, lucerne and pasture hay were the main types.

Considerable interest in the making of silage has been evident. This trend has increased in the pasture improved tableland areas where the production of pasture hay presents some hazards. Spoilage of hay through rain during the curing period has been extensive, and silage-making ensures more economic conservation. Tableland fodder conservation is developing in a three way pattern; silage, hay and grain are conserved in sequence as the season advances.

Flock Composition Trends.—There has been a definite trend towards an increase in the number of breeding ewes carried, and a corresponding reduction in the number of wethers.

Wool growing enterprises with dry sheep (wethers) comprise a depressed section of the industry, wherein it is difficult to achieve a satisfactory return. Low wool prices and a high depreciation rate on the wethers have made for an unsatisfactory return from this type of enterprise.

An improvement in mutton prices, brought about by the American demand for manufacturing-grade mutton, has led to an improved price for aged wethers and a consequent slight reduction in the annual depreciation of the wethers.

Higher Stocking Rates.—These are being achieved by better utilisation of feed, better-planned sheep management, and higher standards of sheep husbandry.

Flock Ram Prices.—Prices for British Breed flock rams at auction sales have eased. The values have settled down to a level that bears relationship to prices charged by breeders for sales on the property.

The major Merino studs have maintained flock ram prices at levels ruling prior to the fall in wool values. The smaller studs, however, are now offering flock rams at reduced prices more in line with ruling wool values.

SHEEP OPERATIONS AT DEPARTMENTAL INSTITUTIONS

Condobolin Experiment Farm.—The total number of sheep at present is 3,215, including 1,200 lambs born in the autumn of 1959. This total will be reduced in September, 1959, by disposal of aged ewes and wether lambs. Some 1,600 breeding ewes and 600 ewe weaners will remain.

Drought Feeding Recovery and Breeding Performance.—The past performance is being studied in ewes that had been subjected to drought feeding at the Burdekin Unit at Glenfield. Some of the ewes were mated in May and the remainder will be mated in November, 1959.

Fixation of the Border Leicester x Merino cross.—The project has continued. Four hundred and fifty first cross ewes, mated to selected first cross rams, lambed 95.5 per cent in the Autumn lambing of 1959. Some 700 to 750 ewes will be available for mating in November, 1959.

Cowra Experiment Farm.—The number of sheep has been increased to 1,200.

Lamb Raising Projects.—These have been continued; in the breed comparison trial and in the Autumn Vs Spring Vs Dual lambing comparison.

Early Weaning of Crossbred Lambs.—Further information has been gained. Weaning of lambs on attaining a liveweight of 50 lb. is being studied. Results to date are satisfactory and give further indication that early weaning can become an integral part of the lamb production management pattern.

Grafton Experiment Farm—Lamb Raising in Coastal Environment.—A pilot lamb raising flock comprising 87 ewes has been established in order to obtain factual information

on lamb raising in the coastal environment. To date these sheep have done particularly well. The low incidence of worm infestation as shown by egg counts is rather contrary to expectations.

Leeton Experiment Farm.—Sheep numbers have been increased. The present total of 3,620 is an increase of 1,200 on 1957-58 figures. An increased amount of irrigated pasture, and adoption of a management pattern ensuring more effective utilisation of pasture, have led to the increase.

Lamb Production Research.—Appointment of a Livestock Research Officer (Sheep) has resulted in more extensive lamb production research work.

Early-weaning Research.—The research work relating to early weaning has been expanded. Weaning on the basis of both age and weight is being studied.

Hormone Implants.—The effect on growth rate and breeding performance is now under research at this Farm.

Seasonal Variation in Reproduction.—Studies have been undertaken with Border Leicester x Merino ewes. Incidence of oestrus, fecundity, and lactation and oestrus are under observation.

New England Experiment Farm.—Breeding ewes currently used in lamb production trials comprise the majority of the 1,207 sheep. In addition to a breed comparison trial further work on the effect of post mating nutrition of ewes has been undertaken.

Optimum Time of Lambing for Lamb Production.—A new project has been initiated to determine optimum lambing time for lamb production in the New England environment.

Autumn Shearing.—Information is also being obtained on the effect of autumn shearing.

Breed Comparisons on Lamb Production.—Additionally a comparison is being made between Border Leicester x Merino and Dorset Horn x Corriedale ewes for lamb production.

Shannon Vale Nutrition Station.—A total of 2,073 sheep is now carried at this Station on the New England tablelands. Rigid adoption of a management and nutritional pattern, wherein sheep are fed according to their productive and reproductive needs, has yielded information for wide application—of value in all areas where pasture improvement is possible.

Although New England is predominantly wool growing there has been a marked swing to crossbred sheep. Application of Shannon Vale Nutrition Station findings in sheep husbandry is becoming more widespread, with consequent easing of the nutritional problem and greater production.

Trangie Agricultural Experiment Station.—The Sheep numbers at this Station total 5,617, the highest for some years. Excellent seasonal conditions and increased areas of lucerne have made this number inadequate to control growth.

Merino Breeding Project.—Practically all sheep at Trangie are used in the current Merino breeding project. There is earlier reference to this, in the Research section of this Animal Industry Division report.

Temora Experiment Farm.—The sheep total is now 1,222 at Temora Experiment Farm.

Poll Dorset Stud.—This project has now developed to the stage where stud rams, in limited numbers, are available for sale. Sales of Stud and Flock rams exceeded £1,800 during 1958-59. The establishment of additional families within this stud is now desirable and the purchase of Dorset Horn ewes from studs other than Wagga Agricultural College will introduce new blood lines from which other families can be established.

Corriedale v. Polwarth Commercial Trial.—This trial has now proceeded to the point where, for the 1959 mating, all ewes of both groups will have been bred in the Temora environment and a more valid comparison can be made in the performance of each breed.

Feeding trials to determine the maintenance requirement of Corriedale, Polwarth and Border Leicester x Merino wethers, which are being undertaken at Temora in addition to Glenfield, will have a direct bearing on this trial.

Early weaning of the lambs born in this trial has been successfully carried out over the past three years. Preferential grazing on paddocks previously set aside has given a rate of gain in lambs comparable with that achieved under conventional management.

This early weaning of the lambs has simplified the control of the nutritional status of the ewes and has allowed them to be used as a scavenger flock over an extended period during the late winter and spring. Their maintenance in store condition during this period has allowed the optimum flushing to take place prior to and during mating. Higher lambing percentages have followed this practice.

Tamworth Agricultural Experiment Station.—This relatively new Station has only been used as a depot, for "ration" sheep for Hawkesbury Agricultural College and Wagga Agricultural College. Wether weaners from Condobolin and "ration" sheep from New England Experiment Farm have been fattened at Tamworth and transferred to the College as required. To date this practice has allowed the reasonable grazing of Tamworth Station. With the completion of the fencing and water supply, breeding can be undertaken in the near future. To this end, it is proposed to purchase ewe weaners to develop and have ready for mating in Spring, 1960. This programme will result in more effective use of available feed, will allow some experiment work to be undertaken, and will produce greater revenue.

Yanco Experiment Farm.—The sheep total 1,256; mainly crossbred ewes that are used in lamb-raising trials.

Breed Comparison for Autumn Lambing.—A breed comparison trial with Border Leicester x Merino, Romney Marsh x Merino, and Corriedale ewes mated to Dorset Horn rams, for autumn lambing, has been continued.

Controlled Nutrition vs. ad. lib. Nutrition of Breeding Ewes.—This comparison is proceeding.

Rate of Gain of Lambs on Various Pastures.—This trial is also proceeding.

Spring Lambing Trial.—The mating of maiden ewes with large (Dorset Horn) and small (Southdown) breeds of rams is being carried out in conjunction with a spring lambing trial.

Wollongbar Experiment Farm.—A small flock of 30 wethers for use in silage digestibility trials is carried at Wollongbar Experiment Farm.

DIVISION OF SCIENCE SERVICES

Biological Branch

PLANT PATHOLOGY SECTION

New, Plant Disease Records

Fifty-one new plant diseases were recorded in New South Wales. The beet nematode (*Heterodera schachtii*) was recorded for the first time on cabbage and swede turnip, during a survey of market gardens in the Botany district. Angular leaf spot (*Xanthomonas malvacearum*) of cotton was seen for the first time at Narrabri.

Cereal Diseases

Wheat Diseases.—The 1958-59 season has been one of recovery from drought conditions. The harvest was excellent; despite unusually severe frost injury, stem rust in epidemic proportions in some northern and central districts, and premature ripening in some southern crops.

Frost injury was severe throughout the wheat belt. Crops were in a very soft and forward state when hit by severe frosts in July, August and September, 1958. All forms of injury occurred but stem frosting caused far the greatest damage. The worst damage occurred in early sown crops of early varieties in low-lying situations. In many cases the original growth was so badly damaged that the harvest was mainly from subsequent regrowth. Later frosts, at the flowering stage, also caused considerable damage; and crops, frosted after the grain had set, produced pinched grain.

Fortunately the spring months and conditions at harvest were the best for many years in most districts, and many damaged crops finished surprisingly well.

Mild conditions early in the season favoured a build-up of stem rust (*Puccinia graminis tritici*). This reduced the yields in some crops of susceptible varieties in parts of the north-west and central-west. Climatic conditions later were unfavourable for the disease and later crops were little affected.



"Out of Town' Science Services Accommodation"

On a seven acre site at Rydalmere, some 14 miles from head office, a £400,000 block of laboratories is being erected to re-house the Biological, Entomological and Chemist Branches of the Department's Division of Science Services. The Hon. Roger Nott, M.L.A., Minister for Agriculture, laid the Foundation Stone on 7th May, 1959; with him, from the left, are Dr. C. J. Magee, Chief of the Division and Chief Biologist, and Dr. R. J. Noble, C.B.E., then Under-Secretary and Director.

(Photo.—Division of Information Services)

Gabo and varieties having the Gabo type of resistance were completely susceptible to the main race present. The only commercial varieties which can now be expected to show adult-plant resistance in New South Wales are Festival, Spica, Warigo and Glenwari. Also, races attacking Eureka are very rare at present. It would seem safe to sow this variety until such races again become prevalent.

Of the smut diseases, bunt (*Tilletia foetida* and *T. caries*) continues to be rare. Maintenance of adequate seed treatment should ensure the virtual absence of this disease. On the other hand, flag smut (*Urocystis tritici*), which cannot be adequately controlled by seed treatment, continues to become more prevalent in the susceptible variety Gabo.

Foot-rots and take-all were present as usual, but frost injury in association made it impossible to assess their importance.

Discovery of a sap-transmissible virus disease of the streak-mosaic type, by the Faculty of Agriculture, University of Sydney, was of special interest. A few plants of a new cross sown out of season at Carroll were found to be infected. This is the third virus disease of wheat to be detected in New South Wales since 1956. Cereal yellow dwarf was detected at Tamworth that year, and subsequently another virus disease was found by the Agricultural Research Institute, Wagga. None of these diseases has yet proved to be of any importance here.

Maize Diseases.—"Wallaby Ear", so prevalent last year on the north coast, was inconspicuous during the past season.

Stem- and cob-rots (*Fusarium* spp. and *Diplodia zeae*) and leaf blight (*Helminthosporium turcicum*) continued to be the main causes of loss. It is hoped that greater resistance to these diseases will be incorporated in hybrids in the future.

An interesting occurrence this season has been the detection of a cob rot caused by *Helminthosporium carbonum*. This disease had not previously been recorded in New South Wales. It was found in a seed increase block of 25 x 23 (F1) near Taree. In the United States this disease is reported to be rare, resistance being dominant; with the result that, unless two susceptible inbreds are used to produce a hybrid, it is not susceptible. It is hoped that the position will prove to be the same here.

Head smut (*Sphacelotheca reiliana*) was recorded in numerous crops on the coast and appears to have been unusually prevalent. The warm, dry spring is thought to

have provided conditions favourable for infection. Various hybrids and inbreds were affected, and field observations suggest that Victory may be particularly susceptible; inoculum has been collected and a small trial is planned to see whether this is so.

Sorghum Diseases.—During the past two seasons numerous crops of grain sorghum and Columbus grass (*Sorghum alnum*) have shown a blasting of the spikelets. When the ears emerge a considerable number of the spikelets are seen to have failed to develop properly. An analysis of affected plants by the Chemist Branch, this Division, showed them to be very low in nitrogen, and this is thought to be responsible.

Diseases of Pasture Plants and Field Crops

Diseases of Grasses.—The dying of kikuyu (*Pennisetum clandestinum*) on the north coast was further investigated. Visits, and examination of further specimens, have not revealed the cause. In two experiments, laid down on the banks of the Clarence, miticides were used to control the tarsone-mid mites detected last year. Results were inconclusive, as the condition became inactive shortly after the treatments were carried out.

An apparently similar condition occurs at Broken Hill, but is active in the winter rather than the summer. It has been found to be associated with an unidentified fungus which attacks the stolons.

Ergot (*Claviceps phalaridis*) was noted in seed samples of phalaris (*Phalaris tuberosa*) harvested in the south-west. Many samples contained more than the allowed 1.5 per cent. of inert matter and had to be re-cleaned.

Clover Diseases.—Sooty blotch (*Polythrincium trifolii*) of crimson clover, in the previous year recorded for the first time in New South Wales, at Comboyne, has now been recorded from several coastal localities and also on red clover. 38, 563 W. J. 20422.

Root knot (*Meloidogyne* sp.) was severe in stands of red and white clover in the Taree district and is thought to have been responsible for the death of many plants.

Burn (*Pseudoplea trifolii*) was unusually severe on Ladino white clover in the Taree district. This disease is usually of little or no importance.

Frost injury was severe on clovers in all parts of the State during the winter. The soft-growing Clare variety of subterranean clover was the most severely affected.

Lucerne Diseases.—Anthracnose (*Colletotrichum trifolii*), in the previous year recorded at Appin, for the first time in New South Wales since 1915, was recorded from several localities during the wet period in late summer, 1959. The most serious outbreak was at Pallamallawa. There, a whole stand died back.

Downy mildew (*Peronospora trifoliorum*) was again prevalent, in the cooler months of the year. Some seedling stands were severely checked. Otherwise the damage was transitory. An interesting occurrence was violet root-rot (*Helicobasidium purpureum*), in a stand at Kyogle. Although only a small percentage of the plants was infected the disease occurred in enlarging patches.

Frost injury was recorded from several localities in July and August.

Cotton Diseases.—Bacterial blight (*Xanthomonas malvacearum*) was prevalent in the experimental area on Narrabri Experiment Farm, and was also recorded from Maitland. Angular leaf-spot, black-arm and boll-rot phases of the disease were all present. The unusually moist summer was no doubt responsible for the severity of the infection.

Wilt (*Verticillium dahliae*) was recorded for the first time in New South Wales, from Narrabri Experiment Farm. In other parts of the world this disease is associated with alkaline soils and it is of interest that it has turned up on an alkaline soil here.

Tobacco Diseases.—A plant pathologist has been appointed to co-operate with Division of Plant Industry in breeding tobacco varieties with resistance to blue mould (*Peronospora tabacina*), and in the investigation of the nematode problem.

Pathogenicity tests on promising blue mould resistant cross-bred lines indicate that there are several levels of resistance in the segregating F_2 populations. The detached-leaf method of assessing resistance is under trial.

Cowpea Diseases.—Stem rot (*Phytophthora vignae*) was again severe in stands of the susceptible Poona variety on the north coast. Some farmers have confused this disease with bean fly injury and with stem canker caused by *Rhizoctonia solani*.

Diseases of Vegetable Crops

Potato Virus Disease.—For the fourth successive season no crop submitted on the Tablelands for certification was rejected for excess leaf roll content. This indicates that a high level of freedom from this disease is being maintained in certified seed potato stocks. Mosaic diseases also were not recorded in crops submitted for certification. Purple-top wilt (tomato big bud virus) was present in trace amounts in some crops on the Southern Tablelands.

Late Blight (*Phytophthora infestans*) of *Potato*.—This was of no importance in coastal spring crops. Some development of late blight occurred in the Tablelands main crop. The occurrence was favoured by frequent rains. There was no report of tuber losses due to late blight rotting.

In co-operation with Division of Plant Industry, the project for development of potato varieties immune to the "O" race of *P. infestans* continued. Results for the year showed that a number of seedlings derived from the American variety, Cherokee, and the Scottish seedlings, 1928c(2) and 914a(91), were immune to the "O" race. One third year seedling derived from the cross (11-79 x Cherokee) is immune to the "O" race and appears agronomically promising.

Common Scab (*Streptomyces scabies*) of *Potato*.—In co-operation with Division of Plant Industry, the project to develop scab resistant potatoes suitable for local culture is being continued, using the varieties Cherokee, Ontario and Emilia as parents. The variety Emilia (*Solanum tuberosum* sub. sp. *andigenum*) was found highly resistant to scab in previous trials on the Central Tablelands. One hybrid (Emilia x Awaba) is now at the second year seedling stage and shows agronomic promise.

Early Blight (*Alternaria solani*) of *Potato*.—Development of this disease in Tableland crops was more extensive than for a number of years. It was favoured by wet weather at and after flowering. Yield reductions were recorded in all Tableland areas. The disease was particularly severe in crops in the Crookwell area of the Southern Tablelands. There, a general yield reduction of 10-20 per cent. occurred in crops of the Cotta Walla and Bannister Certified Seed Associations, with up to 50 per cent. yield reduction in a few instances.

The red-skinned varieties Crana, Pontiac and Aussie were most severely affected, while Walanga showed good field resistance. Early blight was moderate to severe in the Plant Breeder's plots at Glen Innes, and there did not appear to be any worthwhile resistance in the varieties and seedlings.

Fungus Wilts of Tomato.—Cultures of pathogenic strains of *Fusarium* and *Verticillium* were again prepared and supplied to the Division of Plant Industry, for use in its programme of breeding varieties of tomatoes resistant to fungus wilts. *Fusarium* wilt was more prevalent than usual in the variety Gross Lisse, which has always shown good field resistance to this disease. Selection of the strain "Q2" from Gross Lisse, and the further selection of high yielding strains by seed merchants, may have been responsible for segregation of less resistant types. However, several lines which have been kept separate since 1950 were equally susceptible, when tested under field conditions and in pot culture.

Virus Diseases of Tomato.—Yellow Top disease was again widespread, causing serious loss, in many individual crops. It is now well established on the far North Coast. There, further vector studies are in progress.

Drop head wilt virus has been further studied. It has now survived for twenty-one months in dried, powdered tomato leaves. The virus has caused root necrosis of all tomato varieties tested, with the exception of two unnamed varieties bred for resistance to tobacco mosaic virus.

Previously known only to occur in glasshouses in the Warriewood-Mona Vale district, near Sydney, the disease has now been identified in tomatoes grown in glasshouses at Burunga in the southern portion of the Western Division. No interchange of seeds or seedlings between the two areas appears to have taken place. Thus, it seems that the virus is widespread.

Bacterial Canker of Tomato.—Following widespread publicity and the use of a hydrochloric acid dip by seed merchants, the incidence of bacterial canker has reverted to a low level.

Soil Fumigation for Tomato Root-knot.—Efficiency of 1.2 dibromo 3 chloropropane ("Nemagon") for the control of root knot (*Meloidogyne incognita* var *acrita*) in tomatoes was tested at the Botanic Gardens. A water dispersible concentrate (80 per cent. active ingredient) was applied to soil at the rate of 1.25, 2 and 9 gallons per acre, eighteen days prior to planting out tomatoes.

Although "Nemagon" applied at these rates controlled root knot, plants growing in soil fumigated at each of the three rates exhibited a brownish discolouration of the outer root tissue. More critical work is needed, to determine whether the root injury would cause decreased yields, before this fumigant could be recommended for root knot control in tomatoes.

Bean Seed Certification Scheme.—The Bean Seed Certification Scheme was continued, in co-operation with the Division of Plant Industry, for the sixteenth successive season. Fewer crops were planted for certification, because of the large surplus of seed from the previous harvest.

Of eighty-five crops inspected, forty-eight were certified, and three were approved for growing-on for inspection in the following year. Of the thirty-four crops not certified, nine were rejected because of the presence of halo blight and one because of anthracnose, six were destroyed by rain, and eighteen were picked for green beans.

Testing of a large number of single plant selections from several lines of the Vickery strain of Brown Beauty showed that this line (released several years ago as resistant to strain 1 of anthracnose) is now contaminated with susceptible types—to the extent of about 30 per cent.

A selection and testing programme has been started to re-establish the 100 per cent. resistance of this line; and the rules of the Bean Seed Certification Scheme have been altered, to minimise the chance of mixing of different lines of seed—the main explanation of susceptible plants in the Vickery strain.

Bean Anthracnose.—The search for resistance to anthracnose continued. In a field trial during the summer, with over three hundred cross-bred lines, some in advanced generations, several showed very promising commercial characteristics.

Glasshouse inoculation has revealed that a number of these are resistant to the most common race ("Aust. 6") of anthracnose in N.S.W. The resistant lines include crosses of Hawkesbury Wonder x Westralia (and the back-cross to Hawkesbury Wonder), Hawkesbury Wonder x Kentucky Wonder, and Stringless Black Valentine x Westralia.

Also, several lines of the inter-specific cross Hawkesbury Wonder x Scarlet Runner (*Phaseolus multiflorus*) have been tested in the second generation; and the resistant lines are being carried on for back-crossing to Hawkesbury Wonder. Numerous sterility problems are associated with this cross, and yield of seed from the F₂ plants was quite small in all but a few cases.

Several commercial varieties from England and Denmark have also been tested for resistance to race "Aust. 6", and many of them are resistant. These are mostly high-yielding dwarf varieties. They should be of value as breeding parents.

With the wild *Phaseolus vulgaris* and other *Phaseolus* spp. obtained from Dr. O. Norvell, Carnegie Institute, Stanford, California, and collected in Central America, there has been difficulty in getting them to flower. Most of them have made abundant vegetative growth, but there have been flowers on only two of them.

At the outset it was realised that the light requirements of many of these lines were very specific, that, unless suitable light could be provided a great deal of this material could not be used here in breeding work. The two lines that flower well, however, should be quite valuable as breeding parents.

Investigations of intra-varietal variation of bean varieties in their reaction to anthracnose have continued. In the few cases so far studied in detail, the resistant plants sorted from a heterogeneous line have bred true for resistance, and no segregation occurs.

Pea Diseases.—The stem, leaf and pod disease (*Mycosphaerella pinodes*) is the most common disease of peas in N.S.W., and further work on its control has been commenced.

The main means of spread in this State is air-borne ascospores, produced on diseased crops and on dead plant parts. Spraying trials were carried out to determine if crops could be protected, but no control has been obtained.

The fungicides used were zineb (2 lb. per 100 gallons water) and copper oxychloride (2 lb. per 100 gallons water), both with the addition of a wetter. Various methods of fungicide application to peas were also tried this season. Applications have been made from a tractor-drawn boom spray, a knapsack sprayer and a portable misting machine.

Lines of pea seed of various varieties being sold in N.S.W. have been examined also, and about 50 per cent of lines are carrying *Mycosphaerella pinodes* as an internal contaminant. In most cases, contamination is at a very low level. Usually less than 1 per cent. of the seeds are affected.

Preliminary experiments with hot carbon tetrachloride treatment of pea seed indicate that this could be of value in freeing small lots of seed from internally-borne fungi. Some reduction in germination was caused by this treatment.

Soil carry-over of the disease is also being studied.

Powdery Mildew of Rockmelon (*Oidium* sp.).—For nearly twenty years the rockmelon variety P.M.R. 45, bred in U.S.A. for resistance to "race 1" of powdery mildew, had been resistant to the disease in New South Wales.

P.M.R. 45 is a high-quality melon of good keeping quality. These attributes, combined with its resistance to powdery mildew, led to its widespread cultivation in this State. It now constitutes over 80 per cent. of the rockmelon acreage.

Last season this variety became heavily infected with powdery mildew in the lower Murray Area and in the Murrumbidgee Irrigation Areas. Thus, either another powdery mildew fungus is present in those regions or a new race of the prevalent powdery mildew has appeared.

In each of the areas the varieties P.M.R. 5 and P.M.R. 6 were highly resistant to the disease. Also, at Yanco Experiment Farm in the Murrumbidgee Irrigation Area, the varieties Edisto, Mildew R.D. 2 and Rio Sweet x 7046 were highly resistant.

P.M.R. 5 and P.M.R. 6 were bred in the United States for resistance to "race 2" of powdery mildew. This race appeared there in 1938 and was capable of attacking P.M.R. 45.

In the United States, it has always been accepted that the rockmelon powdery mildew was caused by the fungus *Erysiphe cichoracearum* and that breeding work had produced varieties resistant to one or both races of this fungus.

In the past, it has also been assumed that *E. cichoracearum* caused powdery mildew of rockmelons in New South Wales. Recently, however, it has been claimed (Clare (1958) Aust. J. Sci. 20: 273) that the powdery mildew disease of rockmelons and other cucurbits in south-eastern Queensland is

caused by the fungus *Sphaerotheca fuliginea*. This fungus causes cucurbit powdery mildew in a number of Asiatic countries.

Definite identification of powdery mildew fungi is not possible in the absence of the perfect stage, and the exact pathogen and race position in New South Wales is now obscure. Current studies have been undertaken in an attempt to clarify the position.

Fusarium Wilt (*F. oxysporum* f. *melonis*) of Rockmelon.—The variety Spartan Rock, bred at Michigan State College, U.S.A., was introduced to N.S.W. last year. It proved highly resistant to *Fusarium* wilt in plantings at Griffith and at Yanco Experiment Farm. This variety and also the previously tested and highly resistant variety Delicious 51, are now being used in the rockmelon breeding programme at this Farm.

Spartan Rock has been crossed with P.M.R. 5 and P.M.R. 6 in an endeavour to produce varieties with combined resistance to *Fusarium* wilt and the powdery mildew which attacks P.M.R. 45. Some of the F₁s will be crossed to Rio Sweet x 7046, to incorporate also resistance to downy mildew (*Pseudoperonospora cubensis*).

Downy Mildew (*Pseudoperonospora cubensis*) of *Cucumbers*.—Valuable results concerning the reaction of a number of cucumber varieties to this disease were obtained from a trial conducted by a commercial seed producer at Dundas.

Under autumn conditions very favourable to this disease, the variety Palmetto showed the highest resistance to downy mildew and the varieties Ashley and Stono were also highly resistant. Strain 343 of the variety Santee showed some resistance, but Strain 102 showed only slight tolerance. The varieties Early Fortune, Marketer and Palomar were very susceptible to the disease.

Beet Nematode (*Heterodera schachtii*).—This was detected in two localities. In a home garden at Botany it had heavily reduced beetroot and swede turnip yields and also had attacked cabbage. It was also found infesting a number of old established market gardens at Brighton-le-Sands. There, it had reduced the beetroot yields.

Previously the beet nematode had been found in the metropolitan area at Mascot and Milperra. The additional records made during the year indicate that this nematode is probably present on a number of older market gardening properties situated on lighter soils in the eastern and southern sections of the Sydney area. Further surveys have been planned.

Misting of Vegetable Crops.—In co-operation with Entomological Branch, this Division, a trial was carried out at Gosford Citrus Experiment Station, Narara, to test shoulder-mounted misting machines for application of fungicides and insecticides to beans, cucumbers and tomatoes.

Application of zineb to cucumber, using a machine in which the nozzle is fixed, failed to control downy mildew. The machine did not give an adequate coverage of the plants.

Application of zineb to beans, using a machine with a fixed nozzle, and a machine in which the mist could be directed, did not give adequate control of bean rust.

Further work is required on the misting of tomato crops, to determine the efficiency of control of early blight disease and to determine the extent of phytotoxicity from mist applications of fungicides in misting oil.

Citrus Diseases

The growing period was favourable for citrus in most parts of the State. No outstanding disease problem arose.

Deterioration due to *Phytophthora* root rot had reached a peak in 1956-57, but receded in importance. Most of the trees affected in the years of heavy rain and floods in 1949-52 and 1955-56 have now died or been removed.

Due to dry conditions at blossoming, Melanose and Scab were not problems in coastal orchards; and moderate to heavy melanose infection occurred only in relatively few mature blocks of Washington navel and Emperor mandarin following summer rains. On the other hand, a rather severe development of Black Spot occurred early in summer in some Hills district and Gosford orchards. *Septoria* spot was well controlled in M.I.A. orchards. An extremely heavy crop of Emperor mandarin resulted in some severe Scald in Hawkesbury River orchards.

Research into the effect and distribution of virus diseases continued in collaboration in part with officers of the Division of Horticulture. The now general use by nurserymen of Scalybutt-free buds for propagation on trifoliata stock assures a high standard of quality in nursery trees. A major need is the finding of a root rot resistant stock for lemons, especially

for replanting; since trifoliata appears to be incompatible with the Eureka variety. Use of nucellar Scalybutt-free Eureka selections on sour orange stock is being explored as a possible solution.

In previous years only Scalybutt and Psorosis have been considered in virus certification, but the finding of Xyloporosis in several localities has raised the question of the possible relationship of this disease to some unexplained types of deterioration. Preparations have been made to index selected scions for the presence of this disease at the Citrus Experiment Station, Somersby.

Scalybutt of Trifoliata.—Seedlings raised from Scalybutt-infected trifoliata selections have been grown at Narara for observation on seed transmission of this disease. These comprise about 800 trees varying in age from 7 to 12 years. The strain of Scalybutt infecting the parent is one which develops in four years. No symptom of Scalybutt has developed in any of these trees, and it is concluded that if seed transmission does occur it is very infrequent.

Stunting on Trifoliata Stock.—In 1954, trees of a vigorous nucellar navel, the Bellamy navel, were propagated; and inoculated by budding from trees showing stunting, but not scaling, on trifoliata stock. Selections from stunted Valencia and Washington navel orange and from grapefruit were used. Some differences in tree size and cropping habit are now commencing to show up, as between inoculated and non-inoculated trees. They indicate the possibility that a virus is involved.

Stunting-Scalybutt Relationships.—To determine whether stunting of the scion without bark scaling of the stock is related to Scalybutt disease, trees of Marsh grapefruit, of stunted, intermediate, and non-stunted type, were propagated. They were inoculated with a rapidly developing strain of Scalybutt.

Scalybutt-inoculated trees have been lacking in vigour for the past two years; and the first symptoms of scaling have now appeared in some trees of each type, four years after inoculation-budding. There has therefore been no retardation of scaling in stunt-affected trees. Similar results were obtained with dwarfed Washington navel oranges inoculated with Scalybutt. This indicates that Scalybutt and Stunting are probably due to unrelated causes.

To determine whether different strains of Scalybutt virus exist, and to obtain information on the range of symptoms and time taken for symptom development, Scalybutt-free yearling trees of Valencia were inoculated with buds from three distinct symptom types. A high proportion of trees inoculated with two of these selections are now scaling, at 4 years from the date of inoculation.

Tristeza and Stem Pitting.—To determine whether the presence of mild symptom-less strains of stem pitting virus would protect grapefruit trees from field infection by a severe fruit distorting strain, plantings were made at Somersby. Several mild-strain selections whose parent trees showed little or no fruit symptoms were planted. Interspersed with these, as a source of inoculum, trees propagated from a source with severely affected fruit were planted. Mild-strain progeny are at present carrying normal fruit. In addition, trees of a nucellar virus-free Marsh grapefruit were inoculated with mild strains for protection. The fruit carried by almost all of these trees this season are of good quality. The exception is fruit from one series inoculated from a Thompson grapefruit source. This series, and Thompson grapefruit trees of the same bud source, are carrying small fruit.

In 1958, buds of a number of Marsh grapefruit, and of lemon, Seville, shaddock and other varieties, were worked onto two-year old rough lemon stocks. The growth from some of these buds in the spring was extremely stunted and yellow; showing symptoms of tristeza virus, presumably acquired through aphid inoculation of stocks. Further growth of these non-tristeza tolerant strains is being investigated. Tolerant scion varieties on the same stocks were unaffected.

Lemon Crinkle.—Further inoculations were made, of two strains of this virus to a range of citrus seedlings. Symptoms were produced only on seedlings of Eureka and Lisbon lemons, confirming earlier results. Cross inoculations with Psorosis virus yielded no evidence of interference between Crinkle and Psorosis, and it is concluded that the two are unrelated.

Xyloporosis.—A second occurrence of Xyloporosis in Ellendale mandarin on trifoliata stock was located in a Narramine orchard. A single affected Ellendale on rough lemon stock has also been located. This tree, now over twenty years old, though not vigorous, has not declined in the same way as the young trees on trifoliata; and it seems likely that trifoliata has accelerated symptom development.

Propagations have been made to elucidate this point, and citrus varieties are being surveyed to determine the extent of Xyloporosis in a symptomless state. Symptoms of Xyloporosis were seen in Sampson tangelo trees on trifoliata, in Harvard blood orange on trifoliata, and in Golden Nugget orange on trifoliata.

Yellow Ring.—This disorder has now developed in bitter Seville oranges on trifoliata stock. The onset was sudden and severe, and the trees died at the age of three and four years. Severe Yellow Ring symptoms also developed in nucellar Eureka lemons on Carrizo and "Narara" citrange and in Knight citron on trifoliata. Smooth Seville, Poorman orange and bittersweet Seville are not as yet showing Yellow Ring symptoms on trifoliata.

It is suspected that the disorder is an effect of incompatibility. Experimental propagations have been made, using intermediate stem pieces, to test this theory.

Nucellar Eureka lemon trees which developed yellow ring symptoms two years ago are now partially recovered. They are showing symptoms indicating that Yellow Ring may be a recurrent development but not immediately fatal in this combination.

Woody Gall.—Some further examples of this disease have been found, including two of Eureka lemon and two of bitter Seville orange seedlings. Buds from affected bitter Seville and from affected rough lemon, from Minnamurra and Gresford, inoculated to rough lemon indicator seedlings, resulted in Enation production. The possible relationship of Enation and Woody Gall virus is being examined.

Mandarin Brown Spot.—Spray trials at Lower Portland included Bordeaux mixture 2-2-40, Zinc Bordeaux mixture 1-1-1½-40, Copper (oxchloride 1 lb. to 40 gallons, and mixtures of Copper oxchloride and Zineb, plus white oil. Sprays were applied at petal fall, and in mid-November and mid-February.

The best results were achieved with a mixture of ¼ lb. copper oxchloride and ½ lb. Zineb in 40 gallons of water, with a per tree average of 4.25 affected fruit as compared with 42 per tree on unsprayed trees. The crop-thinning caused in previous years by a spray twice this strength did not occur.

Investigations into the etiology of Brown Spot have been continued. Some interesting evidence has recently been obtained, indicating that a pathogenic *Alternaria* appears to be involved. Inoculation studies with pure cultures have shown that typical lesions can be obtained in three days on Emperor mandarin shoots. The *Alternaria* has been consistently isolated from Brown Spot lesions on Emperor mandarins throughout the autumn. As well, the fungus species has been isolated from six other citrus varieties.

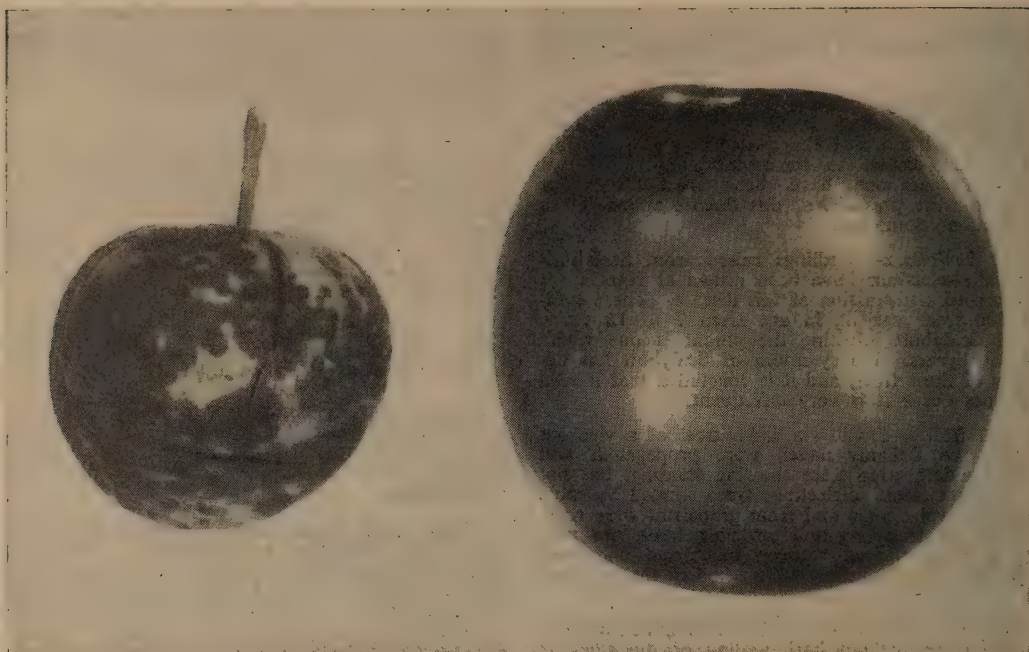
"Sudden Death".—This disease continues to cause losses in some coastal and inland orchards. Examples were seen of *Coprinus* infection of the crown roots of old mandarins on rough lemon stock, and of Parker mandarin stock, following *Phytophthora* injury.

Inoculation of killed sections of small roots with cultures of *Coprinus* sp. resulted in an extension of wood staining into living tissue, in the case of trifoliata and Carrizo citrange. Inoculated sections of the roots of rough lemon and sweet orange rotted completely without the establishment of *Coprinus*. Further inoculations have been made, using larger roots—inoculated close to the butts.

Winter Yellows.—This disorder was again widespread during autumn, 1959, in young citrus in all citrus growing areas. It affected oranges on trifoliata and rough lemon stocks, and seedling Emperor mandarins.

Histological examination of affected specimens indicates the following sequence of events. Affected trees make vigorous late summer growth. This totally depletes the food reserves in the root system. Normally this food reserve is restored as the new foliage matures and becomes functional; but in trees which develop yellows this does not occur and the roots commence to die, probably as a result of starvation. Effective root activity therefore ceases. Photosynthesis in the new foliage results in accumulation of starch in the leaves, particularly in chloroplasts, and these lose their green colour. No transport of carbohydrate away from the leaves appears to take place.

Citrus Nutrition.—The role of various essential nutrients in relation to the health and nutrition of Valencia orange trees on trifoliata stock is being further investigated at the Gosford Citrus Experiment Station, Narara.



"Apple Scab Eradication"

An eradicator single mercury spray treatment is being demonstrated by the Department with a view to replacing the present schedule of ten to twelve protective spray applications. On the left is an average sample from an orchard sprayed with a poorly timed schedule of Bordeaux mixture and lime sulphur. On the right is an average sample from an orchard which received the single mercury spray treatment.

(Photo.—Biology Branch)

In co-operation with the Division of Horticulture and the Chemist's Branch, a large scale pot experiment covering a site of about one acre has been set up. The soil under investigation in the pots is a sandy loam typical of many of the citrus orchard sites in the Somersby-Mangrove Mountain area.

At this relatively early stage of the experiment no definite conclusion can be drawn but some interesting trends have been observed. Tree condition in this soil type appears to be closely correlated with an adequate calcium content of the leaves. Trees with a low calcium content are quite unthrifty, whereas trees with higher levels are in excellent condition.

Maintenance of adequate levels of calcium within the trees appears to be a problem. The ease with which the trees take up potassium and magnesium from this soil type appears to adversely affect calcium absorption, despite the abundance of added calcium materials in the soil.

Another interesting point appears to be an optimal phosphate content of the leaves despite the wide range in the rate of application of phosphate-containing materials to the soil.

Diseases of Deciduous Fruits

Black Spot (*Venturia inaequalis*) of *Apple*.—The 1958-59 season favoured infection, especially in the Batlow district. There, ten infection periods had been recorded by mid-summer.

With officers of the Division of Horticulture, two Hirst spore traps were operated; one at Batlow and one at Orange.

At Batlow the spore trap was in an orchard heavily infected during the 1957-58 season and treated with 0.01 per cent. phenyl mercuric chloride immediately after the completion of the 1958 harvest. The results indicated a very significant reduction in the spore load; compared with that measured the previous season in a less severely infected orchard where no post-harvest eradicator spray had been applied.

Again, very few spores were trapped at Orange. There, inoculum has not yet built up significantly after the abnormally dry winter of 1957 which greatly restricted the development of perithecia.

At the New England Experiment Farm a long-term experiment with the effects of Black Spot spray programmes, to compare the effect of thiram with that of lime sulphur on

the yielding ability of Granny Smith apples, was continued. The results have not yet been statistically analysed; but at the end of this the fourth season there is evidence strongly in favour of higher yield under the thiram programme. This increase is of the order of 22 per cent.

Apple Black Spot Eradicator Investigations—Investigations into the control of black spot by eradicator rather than protective means were continued in isolated plots of trees at Maroota and Tumorrana.

At Maroota a small apple orchard of 220 trees has been treated since 1955, only by the newly developed eradicator method. Seventy of these trees in one block are the highly Black Spot—susceptible variety Granny Smith, and these trees were severely infected when the first eradicator spray was applied. The remainder of the planting comprises the resistant variety Willie Sharp and a few young Gravenstein trees. The Willie Sharp trees received only the 1955 and 1956 eradicator sprays; while the young Gravenstein trees (planted 1954) received the same spray treatment as the Granny Smiths, as set out below.

No Black Spot lesion has been detected on any of the Willie Sharp or Gravenstein trees since the 1955 autumn spray was applied. Similarly, no lesion has been detected on any of the trees in a young planting about 250 yards from the old trees. These trees were planted in 1955 after having been dipped in 0.1 per cent. P.M.C., and were treated again with 0.1 per cent. P.M.C. in April, 1956. No other fungicide has been applied to these trees.

The Granny Smith trees have been treated as follows, with the results indicated:—

Autumn	Spray Applied	Result the Following Season
1955	0.1 per cent. P.M.A.	One fruit infected. Slight leaf infection on a few trees.
1956	0.1 per cent. P.M.C.	No fruit infection. One lightly infected leaf found on each of four trees late in season. Total of twelve lesions.
1957	Nil	No fruit infection. Trace leaf infection on late autumn growth on six trees.
1958	0.05 per cent. P.M.C.	Ten fruit infected (3 in one group low on one tree). Trace leaf infection on late autumn growth on seven trees.
1959	0.05 per cent. P.M.C.	

The nearest apple orchard for comparison with the above plot is at Glenorie, five miles away; in a climatically similar situation. This orchard has been sprayed with a restricted schedule of protective sprays only. It has sustained moderate to severe infection each year.

At Tumorrana, two small plots of trees of mixed varieties have been treated since 1955; by the eradicant method only. No. 1 orchard contains 16 trees and No. 2 orchard 25 trees; and these were all heavily infected with Black Spot when the first eradicant spray was applied in May, 1955. Since then, no protective spraying has been done in either orchard; and each season has been favourable for Black Spot infection. The treatments and results are as follows:—

No. 1 Orchard

Autumn	Spray Applied	Result in following season
1955	0.1 per cent. P.M.C.*	1 per cent. of fruit infected. Slight leaf infection.
1956	0.1 per cent. P.M.C.	twelve apples lightly infected. Trace leaf infection.
1957	0.1 per cent. P.M.C.	six apples lightly infected. One infected leaf only, detected on one Granny Smith tree.
1958	Nil	No fruit infected. Four infected leaves, on the same Granny Smith tree as in 1958.
1959	Nil	

* Inefficient sprayer used.

No. 2 Orchard

Autumn	Spray Applied	Result in following season
1955	0.1 per cent. P.M.C.*	1 per cent. of fruit infected. Slight leaf infection.
1956	0.1 per cent. P.M.C.	No fruit infected. Trace leaf infection on two trees.
1957	0.1 per cent. P.M.C.	No fruit or leaf lesion detected.
1958	Nil	No fruit or leaf lesion detected.
1959	Nil	

* Inefficient sprayer used.

Each year, observations have been made on a group of completely non-sprayed trees around an abandoned house about a mile from No. 2 orchard; and, each year, these have been found to be heavily infected. The nearest orchard to the treated plots is at Tumorrana Post Office, approximately 3 miles away. This orchard has received a limited schedule of protective sprays only, and each year has sustained moderate to heavy Black Spot infection.

At Batlow, a 10-acre contour planted block of apples was treated in autumn, 1958, with 0.05 per cent. P.M.C. Thorough treatment was not achieved because of the steep slope, and the excessive growth of cocksfoot and other shelter for early fallen leaves on the contour banks. During the 1958-59 season, part of the orchard was treated with a reduced schedule of protective sprays, part with the Mills' system of post-infection eradicant spraying only, and about one acre in the lowest and most scab-labile section was left untreated.

Control in the first two sections was very good. The non-sprayed trees showed trace-infection only, by the end of November, but subsequent secondary infection resulted in a moderately infected crop at harvest time. The infection in this section resulted in part from ascospores from an adjoining large nursery area not treated with P.M.C.

Primary infection was heavy on the headland row of trees adjoining the nursery area; and the amount of infection diminished rapidly, to a mere trace on trees in the fourth row. During two of the infection periods the wind was blowing directly across the nursery area onto the non-protected trees. The range of ascospore flight was no more than 50 yards. Most of the "fall-out" occurred in the first quarter of this distance.

Black Spot Control Demonstration.—At Yetholme, long regarded as the worst district in N.S.W. for Black Spot infection, a demonstration of the eradicant method of control was established in 1956. This was at the close of one of the worst Black Spot seasons ever experienced there. The treatment, 0.1 per cent. P.M.C. has been applied to all apple and pear trees in this small district of 170 acres, as follows:—

Autumn, 1956—0.1 per cent. P.M.C.

Autumn, 1957—0.1 per cent. P.M.C.

Autumn, 1958—Nil.

Autumn, 1959—0.1 per cent. P.M.C.

By the end of the 1957-58 season the disease had been brought under very satisfactory control as a result of the 1956 and 1957 autumn eradicant sprays, supplemented by minimum schedules of protective sprays through the spring.

No eradicant spray was applied in 1958, except to small sections of a few orchards where slight outbreaks of Black Spot had occurred during the 1957-58 season. There was a slight build-up of infection in many orchards during the very favourable infection conditions of the 1958-59 season. In this season, most orchards received either no spray or a virtually ineffective minimum of protective sprays.

The 1959 post-harvest spray was applied by the growers, using their own equipment. Two entire orchards and large sections of some others will be left non-protected next spring.

The condition of one 15-acre orchard which will be left unprotected next spring approached the ideal for the use of the eradicant method of black spot control, in that, the ground has been kept free of excessive weed growth and the trees are of medium size. This facilitates thorough spray coverage.

This was the only orchard at Yetholme thoroughly cultivated before the first autumn spray was applied in 1956. At that time the orchard was heavily infected. In the 1956-57 season a minimum programme of protective sprays was applied and only a trace of infection was detected (six infected apples only).

The 0.1 per cent. P.M.C. spray was repeated there in May, 1957, and a minor schedule of protective sprays was applied in the 1957-58 season—during which, two trees were left entirely non-protected. No lesion was detected on either of these trees nor was any infected apple found in the whole crop.

No eradicant spray was applied there in autumn, 1958, and the two trees left unprotected during the 1957-58 season were again left unprotected—as were an additional twenty-five trees. By the end of the 1958-59 season no lesion had been detected on any of these twenty-seven trees nor on any of the other trees in the orchard; and the crop was harvested entirely free of Black Spot. No eradicant spray was applied in autumn, 1959, and the grower has agreed to leave the orchard non-protected next season.

Commercial Trials of Eradicant Treatment at Batlow.—At Batlow, inoculum was plentiful and ten infection periods had been recorded by the end of December, 1959. Despite these severe infection conditions, control in most orchards was very satisfactory; and this was due in no small measure to the Spray Warning Service provided by the Department of Agriculture, and the now-recommended, improved, protective-spraying schedule.

In April, 1957, a post-harvest spray of 0.01 per cent. P.M.C. was applied, in a commercial trial. This was to a notoriously scab-labile 10-acre block of pears. The results were so outstanding that several growers applied this spray to large orchards in autumn, 1958.

This spray has been shown to reduce the inoculum by from 95 per cent. to 99 per cent. or better, but not 100 per cent. Consequently it needs to be supplemented during the growing season; either by a protective schedule or by post-infection eradicant sprays.

Degree of control in the treated orchards was excellent. In one orchard, where a standard schedule of protective sprays was applied through the 1958-59 season, the grower had been unable to complete spraying the entire orchard with 0.01 per cent., P.M.C. in autumn, 1958. At the 1959 harvest the line of demarcation, between the non-treated and sections treated with 0.01 per cent. P.M.C. the previous autumn, could be clearly distinguished by the increased infection in the non-treated section.

Overseas Interest in the Black Spot Eradicant Treatment.—Many requests continue to be received from other States and from overseas; for reprints of published information and for latest details of the progress of these investigations. Advice has been received that the method has been tried experimentally in Canada and South Africa, with encouraging results in the first season after treatment. The method has also been used successfully on a commercial scale in South Africa.

Powdery Mildew (*Podosphaera leucotricha*) of Apple.—The experiment conducted at West Pennant Hills last season was repeated, substituting a reduced Karathane dosage for the lime sulphur-wettable sulphur mixture. However, no mildew developed in any of the treatments; and the infection of the non-sprayed trees was so slight that no valid comparison could be made.

Virus Diseases of Pome Fruits.—Investigations on virus diseases and virus-like conditions in apple and pear trees were continued at the Gosford Citrus Experiment Station.

These investigations involve virus transmission studies with apple Measles, apple Green Crinkle, apple Wood Tumour, pear Ringworm and pear Fissure Bark. No evidence of transmission of these diseases has yet been obtained.

The two surviving Gravenstein trees on Jonathan stock—subjected to heat therapy for Flat Limb virus inactivation in 1956—were planted out in the orchard at Bathurst Experiment Farm. They have not yet shown definite symptoms of Flat Limb. Budwood from one of these trees was forwarded to the New England Experiment Farm to be worked onto seedling stocks.

The virus disease apple Ring Spot, first identified at Bathurst in 1956, has now been detected in three orchards in that district, one at Oakdale, and seven at Orange.

A nine-years old Jonathan apple tree at Orange showing severe apple Mosaic was double grafted in 1957, firstly with wood from a tree showing mild Mosaic and secondly with wood from a tree showing trace Mosaic only. At the end of the second season there had been no change in symptom expression in the three sections, suggesting no movement of the Mosaic virus.

At Orange, a Williams pear showing severe Ringworm was grafted in 1955 with Winter Cole, Josephine, Beurre Bosc and Packham's Triumph. The Winter Cole grafts have grown well and this year carried several good fruit. The other varieties have grown weakly and have not yet fruited. No Ringworm symptom is evident on any of the grafts.

A *Deciduous Fruit Tree Improvement Committee* has been formed within the Department; with the objectives, firstly of restricting the inadvertent propagation of virus infected trees by nurserymen and, secondly, of providing nurserymen with virus free mother stock of a wide range of deciduous fruit varieties. The Committee is made up of three members of the Division of Horticulture and one Plant Pathologist.

Brown Rot (*Sclerotinia fruticola*) of *Stone Fruits*.—Investigations into the epiphytology of this disease were continued in the Murrumbidgee Irrigation Areas. Hirst spore traps were employed in estimating the daily spore population in orchard air throughout the year. It is now known that brown rot spores are air-borne, but from July, 1958, until mid-February, 1959, no spore was trapped.

The first spores were trapped on 17th February, one to two days after rain, and were trapped daily thereafter; reaching a peak on 25th February. Another peak was reached in March, one to two days after heavy falls of rain. At one time during this peak, 6,000 spores/cubic metre of air were registered.

Spores were in high concentration throughout March and April, and during May and June small concentrations were trapped from time to time.

There was again some evidence of diurnal periodicity in spore dispersal, but this might be related to diurnal variation in wind velocity.

Present observations emphasise: the importance of the twenty-one days pre-harvest protective spray; that spread from tree to tree and orchard to orchard occurs mainly just prior to and during harvest; the potential hazard of an outbreak in early peaches, thence to late varieties in the same area, and the need for sanitation following an early outbreak; and because a peak of spore production follows one to two days after rain, the importance of a pre-harvest spray as soon as possible after rain. To meet this last requirement aerial application may become necessary in some years.

The two demonstrations on a commercial scale, of recommended control measures, were continued at Leeton and Griffith.

Rust (*Tranzschelia pruni-spinosae*) of *Prunes*.—In the Young district, investigations on the control of prune Rust by the use of eradicated spraying was continued.

In two of the three isolated plots at Murringo, 0.1 per cent. P.M.C. was applied on 6th May, when the trees were still in heavy foliage. The two trees on the other property were left non-sprayed. All trees remained non-protected through the 1958-59 season, favourable for Rust infection.

The trees which did not receive P.M.C. became infected first, and had developed a moderate infection towards the end of the season. The trees in the other two plots also became moderately infected a little later.

Failure of the treatment this season compared with the excellent control achieved last season is thought to be due either to the earlier spray application (the spray was applied to dormant trees in 1957) or to a major long-distance flight of prune rust spores.

Shot Hole (*Clasterosporium carpophilum*) of *Stone Fruits*.—At Wiseman's Ferry, thirteen old, neglected apricot trees, with a history of severe Shot Hole and Freckle (*Fusicladium carpophilum*) infection, were sprayed with 0.1 per cent. P.M.C. on 12th June, 1958. No protective spray was applied throughout the 1958-59 season.

No Freckle lesion was detected on these trees and the amount of Shot Hole infection was very slight; contrasting markedly with that usually experienced in these trees and with the heavy infection general throughout the district.

The degree of Shot Hole control achieved by the single winter spray of P.M.C. was equivalent to what would be expected only after about three seasons of treatment with the present, recommended two-spray schedule of Bordeaux mixture in autumn and spring.

At Young, four apricot and two peach trees heavily infected with Shot Hole were sprayed with 0.1 per cent. P.M.C. on 6th May, 1958. These trees were isolated from other sources of contamination and were left non-sprayed except for the P.M.C. treatment. Throughout the 1958-59 season they remained almost free of infection. This contrasted with the very severe infection in the district in general.

Root Rot (*Phytophthora spp.*) of *Stone Fruit*.—Following flooding in mid-summer there was considerable mortality in young peach and apricot plantings in the Murrumbidgee Irrigation Areas. A species of *Phytophthora* has been isolated from apricot roots, but the species has not yet been identified.

Cherry Leaf Spot (*Coccomyces hiemalis*).—Again no evidence of this disease was detected. The fungus seems to have been eradicated. The disease has not now been seen since 1951, when only a single outbreak occurred following the eradication measures adopted in 1950.

Bacterial Spot (*Xanthomonas pruni*) of *Plums*.—In an investigation at Orange a dormant spray of 0.5 per cent. copper sulphate failed to effect any significant degree of control on heavily infected Ruby Blood plum trees.

Similarly, the same spray treatment failed to give satisfactory control of this disease on Wickson plums in an orchard at Medowie. In this orchard the programme of Bordeaux mixture sprays recommended by the Queensland Department of Agriculture has also failed to control this disease effectively, and damage to fruit spurs is evident.

Peach and Prune Replanting Problem.—At Leeton a statistically designed experiment was set up in 1957 to compare water with vapam (at 100 lb., 200 lb. and 400 lb. per acre) as pre-plant treatments where peaches were to replace peaches killed in the 1956 flood.

In the first season there was a marked response to the vapam treatment at the 200 lb. and 400 lb. per acre rates. In the second season, just completed, the increase in growth in all treatment was uniform; the vapam 200 lb. and 400 lb. per acre treatments maintaining the lead obtained in the first season.

At Young, in a small-scale trial, vapam and nemagon were applied as pre-planting treatments, and nemagon as a post-planting treatment twelve months after planting; in an orchard where prunes have been planted following apples. The trees in the sites treated with vapam have continued to make better growth than those treated with nemagon, and much better growth than those which were non-treated.

Also, at Young an experiment was set up, to compare water with ethylene dibromide and with a mixture of ethylene dibromide and chloropicrin, as pre-plant treatment, where prunes were to be replanted into sites in an existing orchard where old trees had died.

At the end of the first season the trees in the sites treated with the E.D.B.-chloropicrin mixture had made better growth than those treated with E.D.B. alone; and both had made much better growth than the trees in the sites treated with water only.

With the latter much dieback occurred from the pruning cuts made when the trees were planted and growth was very weak. There was slight dieback in the E.D.B. plots, and no dieback in the E.D.B.-chloropicrin mixture plots. This evidence indicates that there may be an influence additional to nematode activity responsible for the replant failure with prunes at Young.

A statistically designed experiment was set up in a small peach orchard at Newcastle, where peach replant failure is a problem. It is believed that the nematode *Xiphenema* sp. may be associated with this failure. The following treatments were applied on 30th April, 1959: water, vapam, ethylene dibromide, and a mixture of ethylene dibromide and chloropicrin.

Virus Diseases of Stone Fruits.—Peach Mosaic was discovered in young Halford peaches at Yanco and Bathurst Experiment Farms. The trees at the Bathurst Farm were supplied by the Yanco Farm, and the origin of the disease at Yanco has not yet been traced.

Brilliant leaf patterns occurred in early summer on the trees at Bathurst, and growth encouraged from the Pullar seedling stocks developed symptoms by early autumn. There was evidence of spread of the disease to Rio Oso Gem trees in an adjoining nursery row.

Other stone fruit virus diseases believed to be present in N.S.W. are peach Rosette Mosaic; cherry Tatter Leaf, Mottle Leaf and Rasp Leaf; and plum Line Pattern. *map 303 + 108*

Root Knot (Meloidogyne sp.) of Peaches.—An investigation was commenced in a peach orchard at Sackville, to compare the effect of a chemical treatment on Root Knot control, using nemagon at 5 gal. per acre, and the effect of a cover cropping treatment using *Crotalaria spectabilis* in the summer and oats in the winter.

The trees treated with nemagon appeared to show an initial growth response, but this was not evident at the end of the season.

The *Crotalaria* plants emerged during very hot weather and, as they emerged, scorched off in this very free-draining, deep sand. However, the few survivors grew well and set seed. (This legume should prove to be a suitable summer green crop in irrigated orchards in the central coastal districts. If, at the same time, it should significantly reduce the *Meloidogyne* population it may be very valuable.)

Diseases of Tropical Fruits

Experimental and diagnostic work were facilitated by a greenhouse insectary generously provided by the Banana Growers' Federation Co.-op. Ltd. at a cost of some £1,430. Subsequently, the Co-operative established a £300 fund to aid research into insect pests and diseases of tropical fruits and vegetables.

Leaf Spot (Cercospora musae) of Bananas.—Favourable infection conditions during the summer led to moderately serious autumn and winter defoliation in most plantations where control measures were not applied.

Following successful overseas use of orchard oils applied at a low gallonage per acre for control of this disease, a recommendation was made here in August. It was based on experimental results obtained near Lismore in the preceding year.

A total of 270 portable misting machines of four different makes were imported, under Departmental sponsorship, for purchase by growers, to apply the low-volume treatment.

During the first misting season, just ended, some 2,400 acres (approximately 8.2 per cent. of the total acreage) were misted, whilst the area high-volume sprayed with Bordeaux mixture declined from some 391 acres in the previous year to 132 acres in the current year.

The control of *Cercospora* leaf spot achieved by misting has been very satisfying; plants maturing winter bunches are carrying six to eight leaves, with fruit well filled and attractive. Effective introduction of oil and portable shoulder-mounted misting units has again made Leaf Spot control an economic and practical proposition for all growers. Results of the past season will encourage a considerable increase in the area misted during the coming season. Moreover, low volume concentrate spraying techniques may prove useful also for control of some insect pests and other leaf diseases of bananas.

Leaf Speckle of Bananas (cause undet.).—This took heavy toll of leaves during the autumn. Inclusion of oil miscible copper oxychloride, cuprous oxide, or Zineb formulations, with oil applied for leaf spot control, failed to give consistent control of this disease. Field and laboratory studies on the cause of this disease, and the importance of red spider (*Tetranychus lambi*) in its etiology and the control measures (complementary with the oil misting programme for Leaf Spot control) are proceeding.

Bunchy Top (virus) of Bananas.—Successful control was again maintained by the Bunchy Top Control Scheme, with a slight decline in the number of detections. Division of Horticulture compilations show that detections declined from 4,500 in 1956-57 to 2,700 in 1958-59, whilst the total acreage increased from 27,774 to 29,659 in the same period.

Although the incidence is low, Bunchy Top distribution is widespread throughout the northern area. Isolated detections continued to be made in plantations previously free of Bunchy Top for several years; and the whole problem of latency of the virus awaits elucidation.

Introduction of oil for Leaf Spot control does not appear to have had any significant effect on the population of the banana aphid (*Pentalonia nigronervosa*).

Root Rot of Bananas (cause undet.).—Virtual elimination of beetle borer (*Cosmopolites sordidus*) from plantations, has revealed root loss in bananas to be responsible for poor anchorage. This is especially so on bunched plants. It has revealed root loss to be the cause of general debility of many plantations, especially evident during the winter months.

A strain of the burrowing nematode *Radopholus similis*, which will not affect *Citrus* spp., is closely associated with cortical lesions on the roots of affected plants. This nematode is recoverable from trimmed planting material. Thus, it is likely that infected suckers constitute the chief source of infection in the establishment of new plantations.

The significance of *R. similis* as the cause of root loss, also the host range of this nematode, its longevity in the soil in the absence of bananas, and means of freeing planting material from infection, are under further investigation.

Brown Spot (Alternaria passiflora) of Passionfruit.—Soon after the harvest of winter fruit was completed a ground and foliage spray of 0.1 per cent. phenyl mercury chloride (PMC) was applied to an isolated planting of passionfruit at Duranbah severely infected with this disease. Ten months after the single application of this eradicant spray, the planting is almost free of Brown Spot. The planting developed dense foliage during the autumn and winter and conditions have favoured severe infection, as evidenced by defoliation in unsprayed plantings in the same district.

Diseases of Grapevines

The 1958-59 season in general favoured grapevines. Good crops were produced in all districts.

Rain and high humidity periods just prior to harvest encouraged the development of some fruit rots but, with isolated exceptions, losses were not heavy in proportion to the crop. Most seriously affected were early maturing currants in the lower Murray area. There, the combined effect of Powdery Mildew and bunch moulding substantially reduced the yield.

Black Spot caused slight damage in late spring in some lower Murray vineyards. This was after a spell of cool, wet weather. Elsewhere it was well controlled.

In coastal vineyards, Downy Mildew in early summer caused defoliation where spraying was inefficient or badly timed.

Downy Mildew (Plasmopera viticola).—In co-operation with the Division of Horticulture, spray trials were carried out on Black Muscat grapes at Orchard Hills. The season moderately favoured development of Downy Mildew; rain falling in late spring and summer.

Bordeaux mixture 5-5-100 was compared with Zinc Bordeaux 5-2½-5-100, copper oxychloride of Australian and German manufacture, zineb, ziram and phaltan (all at 1 lb. to 40 gallons of water). Sprays were applied on 21st October, 11th November, 5th December and 22nd December, 1958. A post-harvest Bordeaux mixture spray was applied to half the vines in each treatment.

All treatments controlled Downy Mildew until the harvest was complete. Some mildew developed on new growth prior to the application of the last spray, but this was controlled by all the materials used.

After harvest, Downy Mildew developed even on old foliage on vines treated with zineb, ziram, phaltan and copper oxychloride; and these vines defoliated during April-May, 1959. Vines sprayed with zineb and ziram defoliated first, followed by phaltan-sprayed vines and finally copper oxychloride. Copper oxychloride of German manufacture gave slightly longer protection than did Australian material.

Vines receiving Bordeaux and Zinc Bordeaux retained their foliage until early June; even where no post-harvest spray was applied. All vines receiving a post-harvest Bordeaux spray also retained their foliage.

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Dead Arm.—A spray trial was carried out at Griffith, on vines of the variety Grenache. These had suffered fairly severely during the previous season.

Eradicant sprays of sodium arsenite and PMC were used in the dormant state, and captan was used a bud burst and late bud burst in the spring. There was insufficient development of disease; no results were obtained.

Elsewhere in the M.I.A. there was rather extensive spring infection of the susceptible varieties Cornichon, Waltham Cross and Palomino, and, to a lesser extent Hunter Valley Reisling, Grenache, Frontignac and Pedro Ximines. In some vineyards the damage to bunch stalks caused losses of up to 10 per cent. of the total crop.

Considerable autumn and winter infection occurred in the varieties Chasselas, Traminer and Black Muscat in some coastal vineyards. The disease has in the past been confused by growers with Black Spot. This is now completely controlled; and the full extent of the effects of Dead Arm are being realised.

Virus Decline.—Surveys were continued to determine the extent of virus infection, particularly Leafroll, in New South Wales vineyards. Local material of Red Emperor, Hermitage, Sultana, and Du Lot, taken from vines visually free of symptoms, was used for indexing purposes; since imported material of Mission and St. George is still very limited in quantity.

The major wine variety, Hunter River Reisling, appears to be 100 per cent. infected with Leafroll in Hunter River vineyards, but in Griffith vineyards some plantings were found with no or few obviously affected vines.

Selection of a small number of apparently Leafroll-free vines of Chasselas has been made following observations of behaviour over the past three seasons. Doradillo vines in two vineyards have been found to show about 10 per cent. infection. The varieties Hermitage, White Shiraz, Cornichon, Sultana, Grenache, Pedro Ximines and Black Muscat appear to be free of Leafroll in most areas.

Black Measles.—Mild measles symptoms developed very generally in most varieties in coastal and tableland vineyards late in the season; but the early developing severe type of symptoms were again restricted to young vineyards in the Coomealla area.

Spray trials using sodium arsenite as a dormant application were carried out in two Coomealla vineyards, the varieties treated being Sultana and Hermitage. No control was achieved. The disease is now more extensive in these and other vineyards in this district than it was last season.

A species of *Sporotrichum* was isolated very consistently from canes of affected sultanas from Coomealla. Its possible relation to Black Measles is being investigated.

Bunch Stem Die-back.—This disease, prevalent in some years in vineyards in the Orange district, caused losses ranging from a trace to over 60 per cent. this season. It is characterised by death of fruit pedicles or fairly large sections of bunch stems, at harvest time. No pathogen has been found.

The disorder is most severe in vineyards on red basalt-derived soils, slightly less severe on grey sandy loams and still less on the granite derived soils of the Molong area. Severity of incidence is least on the less vigorous vines. It develops equally in vines on their own roots or on stocks.

The disorder is restricted to the Black Muscat variety. Adjacent Gordo Blanco vines in an Orange vineyard showed no trace of die back, and, at Molong, Hermitage, Waltham Cross, Gross Colman, Cornichon, Red Emperor and Doradillo are without symptoms.

No relationship with potash, phosphate, or calcium nutrition has been traced. A slight trace of this disorder is sometimes seen in Black Muscat grapes grown on basalt soil at Orchard Hills, but it has never been seen in vineyards on alluvial or shale soils, nor in the M.I.A. or Hunter River districts.

Fruit Rots.—Weather just prior to harvest was unsettled in most grape growing areas and some fruit rotting occurred. White Rot (*Concothyrium diplodiella*), alone or with Bitter Rot (*Melanconium fuligineum*), was important in some vineyards in the Hunter River and Metropolitan areas. Individual losses of up to 50 per cent. were experienced.

Late hanging Cornichons at Griffith were affected by Bitter Rot, and up to 30 per cent. loss occurred. Bordeaux mixture, thiram and zineb were ineffective in control.

Botrytis cinerea was responsible for overall loss of 10 per cent. in wine grapes at Griffith.

Diseases of Ornamentals

Diseases of ornamental plants were most severe during the late summer and the autumn. The warm, moist conditions particularly favoured fungal diseases. Soil-borne fungi attacked the roots and crown of many plants in home gardens; and losses due to "damping off" were heavy in seedling nurseries.

Seedling growers were increasingly aware of the need for soil—and container—sterilisation. Losses this year have induced some growers to install apparatus for steaming of soil and equipment.

Powdery Mildews were seen on azalea, bamboo begonia, crepe myrtle, delphinium, hydrangea, rose, and zinnia, from mid-summer until early winter.

Azalea Leaf Gall (*Exobasidium vaccini*).—This was very common, throughout the metropolitan area, during the summer. The pink-red varieties such as William Selkirk appear to be the most susceptible. Removal of galled leaves, and the use of copper oxychloride sprays, gave effective control.

Carnation Wilt (*Fusarium oxysporum* f. *dianthi*).—Severe losses, up to 50 per cent., followed Wilt infections in home garden and commercial plantings of carnations in the Ryde and Cronulla districts of Sydney. Growers were advised to take tip cuttings from healthy plants and to rotate their growing area. Infected cuttings were often the source of contamination of new commercial areas.

Gladiolus Yellows and Basal Brown Rot (*Fusarium oxysporum* f. *gladioli*).—This is now considered the most serious of the gladiolus corm diseases. It has been recorded from many parts of N.S.W. during the last year.

Careful hand sorting of corms when given a pre-planting phenyl mercury acetate dip, and annual rotation of the growing crop, appear to help keep the disease in check. A hot water treatment developed in California to eliminate the fungus from cormels has been tried on a small scale; results will be observed during the spring of 1959.

Rose Wilt (Virus).—This was again evident in rose nurseries during the spring and summer. Incidence in home gardens was negligible. During the coming year it will be possible to assess the merits of some new stocks, namely "Dr. Huey" (a susceptible host) and seedling *R. multiflora*.

Blackrot (*Xanthomonas incanae*) of Stocks.—This was again prevalent throughout N.S.W. The need to adopt hot-water treatment of seed has been strongly emphasised. Use of plastic in lieu of hessian bags has helped acceptance of this practice; treated seed no longer becoming sticky. In commercial plantings, intensive roguing, spraying with Bordeaux mixture, and reducing overhead watering, gave some control of outbreaks.

Mushroom Culture

The cultivated mushroom industry continued to expand, mainly the result of demand by food processing companies. In the period July to October, 1958, 1,267,500 lb. of mushrooms were delivered to food processors. Increasing growers are exploring the possibility of indoor culture. The cleaner mushrooms obtained indoors, compared to those from outdoor ridge beds, are more favoured by food processors. Practically all the mushrooms produced are of the white strain. Quality of commercial spawn continued at a high level.

Nematodes in Mushroom Beds.—The incidence referred to in last year's report was further investigated. Some crop failures have been associated with a high nematode content of the beds, in the absence of parasitic diseases, competitive fungi, or insect pests.

The mushroom spawn nematode *Ditylenchus myceliophagus* was identified for the first time in this State from a number of failing mushroom beds in the Sydney metropolitan area. Other nematodes associated with crop failures were mainly of the genus *Rhabditis*. This includes many saprophytic types.

In beds infected by the mushroom spawn nematodes, the spawn eventually disappears from the beds—a result of direct parasitism by the nematode.

Exact mode of action of *Rhabditis* nematodes is not completely understood but heavy infestation of beds by them results in a decline and eventual cessation of production.

An experiment with *Rhabditis* nematodes from failing beds in Sydney metropolitan area showed that they, in association with bacteria, caused a degeneration of grain spawn cultures.

Source of *Rhabditis* nematode infestation of the beds in local mushroom culture was found to be the animal manure

of animal manure-straw mixtures used in making the compost. Numbers of these nematodes survive the composting process and are transferred to the beds, where they multiply. Some tests indicated that, in the absence of peak heating facilities, fumigation of the composted heaps with methyl bromide, at the rate of 1 lb. per 100 cubic ft. of compost, satisfactorily eliminates *Rhabditis* nematodes.

Exact source of infestation of the beds by *D. myceliphagus* was not determined.

Mat Disease (*Myceliophthora lutea*).—This was recorded for the first time in this State. Infestation occurred in outdoor ridge beds at Maraylya, the main mushroom growing centre in the Sydney metropolitan area. The disease was found only on one property. It caused heavy yield reduction in some 400 square feet of bed. Infested casing soil was apparently the source of the infestation.

Bubbles (*Mycogone perniciosa*) and **Truffle** (*Diehliomyces microsporus*).—Two cases were recorded during the year. In one of the bubbles attacks a 5-10 per cent. loss of production occurred. The grower brought the disease under control by spraying the beds three times with zineb (1 lb./40 gallons water). Even at this relatively high concentration, the fungicide produced no obvious detrimental effect on the mushrooms.

BACTERIOLOGICAL SECTION

Dairy Products Bacteriology

Butter Quality Survey.—A survey of the bacteriological quality of butter manufactured in N.S.W. was conducted as in the previous two years. Because of overseas absence of staff the number of examinations in the survey was reduced by adopting bi-weekly sampling of factories.

A total of 269 samples was examined, and 107 (40 per cent.) of these were found to be unsatisfactory. The most prevalent defect was high yeast and mould count, 76 samples being unsatisfactory in this regard. Excessive coliform counts were obtained on 41 samples.

The three surveys so far conducted show a steady improvement in bacteriological quality; in 1956-57, 75 per cent. of samples were unsatisfactory, in 1957-58, 61 per cent., and in 1958-59, 40 per cent.

Apart from survey samples, 151 routine counts were made in connection with poor quality butter detected during platform grading. Results of all examinations were conveyed to the factories, together with recommendations for methods of overcoming or eliminating particular forms of contamination.

Moisture Dispersal in Butter.—During survey work the opportunity arose to compare the influences of metal and wooden churns, on bacteriological count and moisture dispersal, in one factory. Moisture dispersal was much poorer in the metal churned samples but, despite this, the counts were lower and yeasts and moulds were absent—reflecting the superior cleanliness of metal churns.

Cheese Starters to Factories.—Fresh supplies of lyophilised cheese starter cultures were maintained for distribution to cheese factories. Appreciation of this service is shown by the fact that 1,018 cultures were distributed to all major factories in N.S.W. Steady annual increases in the number issued indicates a greater appreciation of starter activity, and purity, by cheesemakers. They now regularly replace their old starters with fresh cultures.

During the past twelve months there has been a remarkable growth in the home—and small-plant manufacture of yoghurt and cottage cheese. A simple and satisfactory recipe has been developed for the manufacture of yoghurt. Routine analyses have been carried out and suggestions made on manufacturing technique.

Mould Inhibition on Wrapped Cheese.—At the request of the Division of Dairying, investigations were initiated in an effort to provide a cheap method of controlling moulds under the wrapper. Results with sodium diacetate have been disappointing. Further studies will be made next year with other inhibitors.

Bacteriological Surveys in Factories.—Surveys were conducted in two cheese and two butter factories, at their request, to define the causes of specific defects in dairy products.

Nitrogen-Fixing Bacteria

Preparation of agar *Rhizobium* cultures for Experiment Farms, District Agronomists and Biological Branch experiments was continued; 1,350 cultures were distributed, including a large number of cultures for sub-tropical legumes.

The collection of *Rhizobium* strains was maintained and enlarged. It now comprises 105 different strains; the new additions being for a wide range of summer legumes.

Serological tests were carried out for field officers, in connection with the assessment of field trials.

Field testing of stock strains for crop and pasture legumes was continued; with the summer growing species, cowpea, velvet bean, soybean and peanut, all strains proved satisfactory field inoculants for their hosts. There was no significant difference between strains. Trials with clovers, medics, lupins, peas and vetches were sown at Rouse Hill, and these will be assessed in the Spring.

Study of Summer Legume-Rhizobium Relationships.—The *Rhizobium* relationships of the many hosts in the "cowpea group" are little known, and recommendations are thus often confusing. They vary from laboratory to laboratory. Provisionally, it is proposed that SU318, a "Cowpea strain" of wide host range, be used for all species—where no tested strain or strain isolated from the species, or from another member of the same genus, is available.

A project to determine the effectiveness of the four commercial "cowpea type" strains with summer legumes is in progress. One field trial has been completed; one is in progress; laboratory studies have given interesting results and glasshouse work will be commenced in the Spring. Regarding strain SU318, the species so far studied can be classified as follows:—

- (1) Nodulate satisfactory and effectively with SU318: *Aeschynomene falcata*, *Crotalaria* species, *Dolichos bifloris* annual and perennial types, *Desmodium scorpiurius* and *Glycine javanica*.
- (2) Nodulate with SU318, but infectivity inferior to specific strain: *Desmodium uncinatum*, *Indigofera* species, *Desmodium sandwichensis*.
- (3) Do not nodulate with SU318: *Desmodium tortuosum*, *Desmodium intermedia*, *Centrosema pubescens*.

The other two "cowpea strains", SU319 and QA323, follow the same pattern as SU318, while QA372, the "soybean strain", has not nodulated species outside the genus *Glycine*. This study will eventually include thirty-four species with these four strains.

Freeze-dried Seed Inoculants.—A commercial firm has developed a lyophilisation process for preserving strains of *Rhizobium*; intending to market seed inoculants in this form. Laboratory examination shows that these cultures are of high purity and have good storage properties, particularly at high temperatures. Cultures with an initial average count of 4.7×10^9 per bottle had counts of 4.1×10^9 , 9.4×10^8 , and 1.6×10^8 , after storage for four months at 5°C, 25°C, 30°C and 37°C respectively. Field results have so far not been promising. Less than 10 per cent. of nodulation was recorded in a trial with subterranean clover at Rouse Hill.

Testing of Commercial Inoculants.—The survey, commenced last year, of commercial peat cultures on sale in N.S.W., was continued. A marked improvement over last year's disappointing figures is evident. This is attributed partly to the co-operation of country officers in arranging with retailers for better storage conditions for inoculants. In part it is due also to improvements in manufacturers' techniques.

A new development in inoculation methods has been introduced by commercial firms. It is claimed that it will allow pre-inoculation of seed fourteen days before sowing. Research into this aspect has been commenced. Preliminary evidence indicates that the period of survival claimed is excessive.

Bee Diseases

Of thirty-nine samples of bees submitted by the Apiary Branch, Division of Animal Industry, infection with *Nosema* was found in fourteen cases. Samples of pollen, honey, and bees were examined for yeasts in connection with cases of heavy bee mortality.

Entomological Branch

The following problems were amongst those under the attention of this Branch during the year.

FIELD CROP PESTS

Australian Plague Locust (*Chortoicetes terminifera*).—Until spring, 1958, locust activity had been at a minimum for several years. During and since November, 1958, widespread

locust activity has involved the major part of the Central Division, the Hunter River Valley and extensive areas in the Western Division. Various field trials and further progress have thus been possible in the development of an aerial spraying technique.

An experimental aerial spraying campaign was carried out in the Bogan-Castlereagh River area during March, 1958, in co-operation with officers of the Pastures Protection Section. Preliminary field investigations in January indicated a definite flight pattern in the first locust generations. This was supported by observations on the second generation in March. Topography of the area was found to be intimately related to swarm movement, and the importance of river systems in directing and concentrating swarms was established. Regular paths followed by major swarms were termed "driftways", and the aerial spraying tactics were based on the supposition that swarms can be intercepted and treated economically mainly at key points on these driftways.

A total of 5,100 gallons of 7 per cent. BHC concentrate was applied by two independent spraying units, each comprising a Tiger Moth spraying aircraft and an Auster scouting aircraft. Total cost of the campaign was approximately £13,000. Kills in the dimension of 100,000 locusts per gallon of 3.5 per cent. BHC applied, were obtained. The campaign was only partially successful in preventing swarm movement into other districts and did not prevent egg laying in the area.

Extensive egg laying has occurred in all infested districts and, as only very restricted hatchings have been reported since, the bulk of these eggs should overwinter in the ground and represent a potential threat in the spring of 1959.

Parasitism by the egg parasite *Scelio fulgidus* and the fly parasites *Locustivora pachytyli* and *Trichopsidea ostracea* has been observed, but the overall effect on the next generation is not known.

Flood conditions during late March and April, 1958, may have affected the viability of eggs in some areas. However, providing favourable conditions prevail during September, October and November a full scale plague is expected next spring over the greater part of the infestation area in N.S.W.

White-Fringed Weevil (*Pantomorus leucoloma*).—This is now being reported from more and wider areas, lucerne being concerned in most cases. The pest must now be rated amongst the State's most serious.

Further examinations of the soil growing a Ladino white clover dominant pasture on irrigated river flat country near Wingham, have revealed that the area (treated in January, 1958, with a dieldrin spray using 3 lb. active ingredient per acre, followed immediately by heavy irrigations up till the last observation in February, 1959), was entirely free from *Pantomorus* larvae, compared with fairly substantial numbers in the untreated area right alongside.

Treatments with aldrin, 3 lb. active ingredient per acre, and dieldrin, again at 3 lb. active ingredient per acre, applied in the same manner as before, in September, were noticed to kill adults as they emerged in December. The observations indicate a residual effect lasting at least three months.

Aldrin at 2 lb. active ingredient per acre, and a mixture of aldrin and heptachlor at 1 lb. active ingredient per acre, for each insecticide, applied in December, each gave a very good initial kill of emerging adults.

Amnemos Weevil (*Amnemos quadrituberculatus*).—In the last 12 months little progress has been made towards control. Further laboratory studies and field observations have clarified the life-history, habits and other aspects of its general biology.

Field control experiments in 1956-57 and 1957-58 show that:—

- (i) Insecticides, mixed with fertilizer, and sown with the seed when sod seeding, affected the nodulation of subterranean clover; the effects with BHC and high dosages of DDT were drastic; that of aldrin, dieldrin and chlordane less severe.
- (ii) Some insecticides, notably dieldrin, aldrin and chlordane, were valuable in protecting seedling clover in newly sod seeded pastures, from insect pests such as crickets and caterpillars.

In addition, life-history studies and field observations had shown that control measures could best be introduced in January or February, to correspond with the period of maximum adult activity, and prior to intensive egg laying.

The major problem of field control was unresolved, in spite of the testing of most insecticides with a favourable reputation against members of the weevil family.

All previous work, therefore, was reviewed before this season's programme was designed, in an effort to resolve possible defects in control techniques, such as the design of experiments and the methods of application.

Eight experiments were set up in Wollongbar, Kyogle and Murwillumbah districts; located in irrigated and dryland pasture of ladino, red or subterranean clover with a record of *Amnemos* infestation. A spray boom was used to apply all insecticides. All experiments were designed to include large buffers around individual plots; treatments were replicated where possible. Insecticides and rates:—Aldrin $\frac{1}{2}$ —4 lb. active ingredient per acre; dieldrin $\frac{1}{2}$ —3 lb.; DDT 5—10 lb.; heptachlor—4 lb.; thiodan $\frac{1}{2}$ —4 lb.; BHC $\frac{1}{2}$ —2 lb. gamma.

Black Soil Scarab (*Othonnion batesii*).—The known area of distribution of this insect was further expanded by reports of damage in a number of additional districts during the year and there is so far no indication of any abatement of the problem in the districts where this insect has been known. Damage was obscured to a large extent during the late summer and autumn, due to abundant rainfall stimulating a lush growth of herbage and grasses of all sorts.

Summer pastures and crops which might normally succumb to scarab larvae in drier seasons were able largely to outgrow such attack and some very heavy stands of Columbus grass (*Sorghum alnum*) were grown on heavily grub-infested soils. However, late in the season, and with the onset of dry weather, the effects of grub attack became very evident; and summer crops, pastures, and sown winter cereal crops all experienced attack and damage.

Good progress was made in determining some aspects of the biology of this pest, with studies on eggs, larvae and pupae.

The 1958-59 flight season of adults extended from mid-December to early January. The average number of eggs present in the female reproductive system was 24.6. Two "forms" of females are in evidence, "juvenile" and "adult". Juvenile females show no interest in flying and have very poorly developed, or no wing muscles. They appear to be specialized for the "vegetative" exploitation of present resources. Adult females have very well-developed wing muscles and attempt to fly. This form, although produced in the juvenile habitat, is constitutionally unable to stay there; and is better fitted to exploit the "vegetatively" less favourable conditions in the species' geographic territory.

Production of adult females appears to be governed by a "stress" factor operating in or on the population, this form only occurring in patches which have a high population density. The number of eggs per female reproductive system for the two forms are: Juvenile, 28.03; Adult, 13.36.

Two biological factors received closer study this year; namely, an unnamed Thynnid wasp and a species of *Cordyceps* fungus, each of which has come to notice frequently. What part each plays in regulating the population density remains to be seen.

Some extensive control trials with insecticides have been laid down but results are difficult to interpret at present. Several materials show some promise but further information is needed on their effect on grub numbers and pasture composition.

Wheat Root Scarab (*Anodontonyx noxius*).—Damage by larvae of this insect in winter cereal crops was again reported from light red soils in a number of localities. Exploratory trials last season at Tamworth showed, for the first time, very spectacular control by using certain insecticides at sowing—in land where even heavy populations of larvae are known to be present.

Diazinon, aldrin, dieldrin and thiodan appeared to be the insecticides of choice. Further investigations are being carried out this season, to evaluate these materials, especially in regard to practicability and cost.

Pruinose Scarab (*Sericesthis pruinosa*).—Assessment of results of trials carried out to investigate control of this pest in the Dorrigo district have indicated that dieldrin, diazinon, thiodan, BHC, DDT nor parathion gave no significantly better results than occurred in untreated plots.

Pasture Cockchafer (*Aphodius tasmanica*).—In experiments at Orange, good control of this pest was obtained with BHC at rates of 2 oz. to 4 oz. per acre applied by a spinner type fertilizer spreader or by combine, although the former did not give quite such complete coverage. Observations also indicated that 4 oz. lindane per acre gave protection of an area in the year following application.

Bloodworms (Chironomidae).—Until recent years rice growers in the M.I.A. have enjoyed almost complete immunity from insect pest losses. However, bloodworm infestation has

built up strongly. It is now causing some loss, and considerable expense in control measures. During the past season considerable early losses and trouble in a number of areas, necessitating re-sowing, were occasioned—through bloodworms damaging the crops before application of irrigation water. Control measures have comprised drying out the bays, dripping on insecticides at the head of the bays or dusting the seed with insecticide before sowing.

Good results were obtained last season by boom spraying the area to be sown, with dieldrin shortly before sowing.

Investigations will be commenced during the coming season to determine the actual role of bloodworms as a pest of rice; and to test the efficacy of a number of insecticides as seed dusts and for presowing application.

Black Beetle (*Heteronychus sanctae-helenae*).—Large beetle populations observed during the late summer and autumn of 1958 led to the expectation that overwintered beetles would cause severe and widespread damage to spring sown crops. Due probably to the continuance of cool conditions into October, only brief minor swarmings took place. Little damage occurred in the Tweed district but several sugar cane plantations were attacked in the Lower Clarence River district. Growers generally obtained satisfactory results from the use of BHC dusts.

Beetles swarmed at Kyogle in November, and at Tabulam an unusually heavy attack on a seed maize crop resulted in about a 50 per cent. loss.

Some beetle swarming was noted in the Sydney district in November. In one case flying beetles were attracted to a large flashing light on a city building and many of these fell and burrowed through wet concrete and malthoid underlay, seriously damaging the roof, leading to extensive rain damage in the interior of the building.

Dairy farmers in far South Coast districts experienced black beetle infestation in plague proportions during the spring; but widespread use of lindane-superphosphate mixture, in combination with summer crop sowings was successful in averting much loss.

Heavy larval feeding in low-lying paspalum pasture country during the late summer and early autumn resulted in damage to large areas of pasture grass. Following floods in the Richmond River in late February millions of dead beetles were washed up on the beach at Lennox Head.

Slugs (*Agriolimax sp.*).—Moist conditions which prevailed throughout late summer and autumn favoured the development of slugs. These caused conspicuous damage in newly-sown and germinating established pastures. Losses were particularly severe in parts of the Murwillumbah and Kyogle districts, in seedling subterranean, red and ladino clovers and in oats and rye grasses. Significant foliage damage was later seen in various clovers.

Monolepta beetles (*Monolepta australis*).—Extensive swarms of beetles attacked silking maize crops in the Tweed and Richmond districts in December and January, and severely reduced pollination in many crops.

Knapsack dusting with DDT, BHC, DDT-BHC combination, or dieldrin, was relatively ineffective against repeated invasions.

Cob protection was achieved by individual farmers, with dieldrin or DDT-oil mixtures applied with knapsack fog or misting machines. These units afforded a practical means of treating large areas quickly, and the insecticide-oil mixtures gave excellent contact kills. They had an effective residual action against subsequent infestations for three to four days. Severe defoliation of peanut crops occurred at this time in the Richmond district.

Lucerne Flea (*Smynturus viridis*).—During September, reports of damage to young lucerne stands were received from the June and Wagga districts. Experiments to assess some of the organo-phosphorus insecticides against this pest showed that Gusathion or Diazinon, at 1 oz. per acre, plus Malathion at 2 oz. per acre, gave high initial mortality; but newly-hatched fleas appeared subsequently on the treated plots, and follow-up treatment would be necessary. Trithion was shown to be of no value against this pest.

Heliothis caterpillar (*Heliothis spp.*).—Lucerne crops, especially in the areas around Inverell, Warrallda, Graman and Ashford, were heavily infested by these caterpillars during late summer. Flowers and lucerne seed pods were severely damaged.

Aerial spraying, using DDT, was effectively carried out over large areas. Good control was obtained. Following overcast, showery conditions an epizootic occurrence of virus granulosis practically wiped out the populations.

Leaf-hoppers (Jassidae).—Very heavy infestations of leaf-hoppers severely damaged seedling lucerne crops in many parts of the State during the summer months.

Red-Legged Earth Mite (*Halotydeus destructor*).—Extensive infestations occurred over large areas, in pastures, lucerne and cereal crops. Many thousands of acres were treated against this pest.

Investigations connected with lucerne flea control incidentally demonstrated that Malathion was of no value in controlling the red-legged earth mite. Gusathion gave a rapid initial kill of mites, but Diazinon and Trithion gave little promise. It was noted, also, that sparsely vegetated areas, as for example, in a newly-germinated lucerne stand treated with DDT, may be rapidly re-infested by mites invading from nearby heavily-infested untreated areas.

Pea Mite (*Penthaleus major*).—Extensive air and ground spraying was carried out in north-western districts. There, this pest attacked and damaged many acres of young oat crops, also wheat, lucerne and pasture.

PESTS OF LIVESTOCK

Sheep Itch Mite (*Psorergates ovis*).—Few inquiries were received concerning control of this pest and the situation appears not to have developed beyond that of 1957-58, when concern was felt by veterinarians regarding its spread.

Investigations, supported by funds from the Wool Research Trust and private industry, were continued at Glenfield Veterinary Research Station and in the field.

Several possible miticides for this work were screened. The following materials were tested and discarded: Chlorobenzilate, Chlorpropylate, Zineb, Phencaptone, Kelthane, Alodan, Asuntol and Neguvon; a mixture of ortho-dichlorobenzene and DDT also gave unsatisfactory control, whilst diazinon used at twice the concentration normally recommended for blowfly control gave unsatisfactory initial kill of mites.

Elimination of mites from the experimental pairs of sheep was obtained with Malathion, Lime sulphur, Dymite (a commercial product containing the delta isomer of BHC) and some of the arsenical formulations.

Work is also being conducted with glycerine-based arsenic-dieldrin, and arsenic-derris plus wetters. The value of a single and double dipping in sodium arsenite is also being checked.

Sheep blowfly (*Lucilia cuprina*).—Investigation of insecticidal resistance in the sheep blowfly was continued. Dieldrin-resistant flies are widely established throughout the State.

Because of the resistant strains and the need for an alternative insecticide, trials were undertaken in conjunction with private firms to ascertain the merit of diazinon when correctly applied. This work established that diazinon will give effective control of fly strike in sheep, provided the wool is saturated with insecticidal liquid at the time of treatment.

Laboratory studies with dieldrin-resistant strains of flies have established that the flies are also resistant to aldrin, BHC, endrin, isodrin and chlordane, but are not resistant to either DDT or diazinon.

A method has been developed to raise the order of dieldrin resistance to a very high level with one selection. Male flies able to withstand a level of insecticide toxic to all susceptible flies are first sought. The males are then mated with virgin female flies. Two to four days after mating the female flies are treated with a dieldrin dosage known to be toxic to heterozygote and susceptible flies. Provided there are any survivors the progeny of these female flies contain at least 50 per cent. resistant individuals.

Because sheep blowfly resistance to organic phosphate insecticides might develop, a selection programme has been commenced, with diazinon and malathion, on both susceptible and resistant strains of flies. This programme is now in its fifth generation, but there is no evidence of physiological resistance, although vigour tolerance is suspected. An interesting aspect of this study is the indication that dieldrin-resistant flies are slightly more susceptible to diazinon than susceptible flies.

Preliminary genetical studies on dieldrin-resistant strains indicate that resistance may be explained in terms of an oligogene. This tentative conclusion is being checked, due to reversion being noted in the resistant strain of flies used in the crosses.

The original resistant strain of flies, held in the laboratory for nineteen months, has passed through twenty-five generations, and is now fully susceptible again. There is evidence

that susceptible individuals begin to appear after some ten generations, but as already indicated a high level of resistance can be developed again with a single selection.

The work in progress was recently reviewed with Professor A. W. A. Brown, United Nations World Health Organisation consultant on insecticide resistance, when he visited Australia whilst surveying the resistance problem in the South-West Pacific Area. Dr. Brown expressed considerable interest in the progress of the work. He was particularly interested in the genetical studies, and the possibility of a negative correlation between dieldrin and diazinon making dieldrin-resistant flies more susceptible to dieldrin following diazinon pressure.

Field officers of the Division of Animal Industry collected fly larvae from struck sheep during the autumn of 1958. Colonies were successfully established from thirty properties west of the Dividing Range, with a scatter throughout the State, except from western regions outside a line between Bourke and Moree and north of Wentworth. In all but two instances dieldrin resistance was established with these field strains of flies. This supports the sudden reduction in the sale of dieldrin and aldrin for sheep blowfly control in this State.

STORED PRODUCTS PESTS

Grain Weevils (*Calandra* spp.).—A small trial confirmed the effectiveness of 3 per cent. Malathion in wettable powder and emulsion forms as a residual spray in and around silos prior to filling with grain. A long term storage trial with wheat is in progress at Temora Experiment Farm, using magnesite. Considerable interest is being shown by farmers in this method of grain protection.

Flour Insects.—A technical service was given to flour millers, biscuit manufacturers, food processing plants and other handlers of milled cereals. Hygiene, layout of plant, control by temperature and the use of fumigants (general and spot), residual insecticides, and fogging, all received attention in the numerous instances of concern over insect infestation of milled cereals.

TIMBER PESTS

Termites (Isoptera).—Data on species distribution of termites in New South Wales is being acquired in collaboration with the Forestry Commission. A number of inspections of infested buildings were made during the year and recommendations made to owners. Chlordane treatment in 1956, of a hay shed at Tamworth Experiment Station infested with *Nasutitermes exitiosus*, continues to prove effective; whilst termite activity in nearby logs and untreated fence posts is still high.

DOMESTIC INSECTS

Flies.—Investigations at Blayney Abattoir, at Bathurst City Area, at Yanco Experiment Farm, Hawkesbury Agricultural College and several other lesser domestic sites, showed that the problem of fly worry was induced in all instances by sub-standard sanitation. Lack of organized refuse disposal, and undirected chemical control measures, contributed largely to the position.

A large-scale, fly abatement campaign by use of aircraft was observed at Bathurst where an attempt was made to eliminate the fly population from around a large cannery. The campaign was not successful and the fly population was only temporarily depressed. A "Micron" concentrate sprayer was tested to determine the practicability of its use in the application of residual sprays to the large fly infested areas of the city. It was considered to provide more efficient application than was obtained from aircraft.

The specific problem of houseflies breeding in poultry manure in intensive egg farming houses was investigated. This indicated that satisfactory control measures could be offered. The flies mainly implicated were *Musca domestica* and *Fannia* sp. Several chemicals were tested for treatment of manure and in most cases an adequate kill of maggots was obtained. It was shown that larvae commonly migrate from one region of manure to another for pupation, and advantage can be taken of this knowledge by timely removal of the limited amount of manure in the outside drier strip where pupation occurs.

Ants.—The number of ant inquiries dropped sharply from the 798 recorded in 1957-58, and only 554 were recorded at the Entomological Branch. As in previous years six common genera represented the major portion of the ant inquiries

handled, viz., *Pheidole* spp. (234), *Tapinoma minutum* and/or *Iridomyrmex darwinianus* (99), *Iridomyrmex* spp. (57), *Tetramorium guineense* (37), *Monomorium* spp. (36) and *Technomyrmex* spp. (35).

The Argentine Ant Eradication Campaign.—The Argentine Ant (*Iridomyrmex humilis*) Eradication Campaign in the Sydney district is now in its 6th year of operation, and to date a total of some 3,600 acres of infestation is known.

Cost of the campaign to date is approximately £84,500, half contributed by the New South Wales Treasury and other half by local government bodies in whose areas the eradication work is carried out. As the end of this large-scale eradication experiment is in sight, plans for continuation of the work as a service project are being considered—to ensure final eradication of all known infestations and others likely to be reported.

The success of Sydney's Argentine Ant Trial Eradication Campaign is demonstrated by the following results:—

During February-March-April, 1959, the 178 areas, containing 10,735 properties and covering 3,590 acres, which have been sprayed since the beginning of the Campaign in 24 local government areas in and near Sydney and Wollongong, were surveyed for the presence of persisting infestations. One or more Argentine ants was found on only six properties in four different areas of infestation.

Included amongst the 174 acres apparently freed from Argentine ants are 120 areas which have been sprayed once only. Of these, two have been surveyed five times, sixteen on four occasions, fifteen on three occasions, fifty-one on two occasions and thirty-six once only.

In fifty-three of the other fifty-four areas, "spot" spraying (re-treatment) has been necessary four times in two of them (Mascot and Lidcombe, the two largest), on three occasions in two others (North Lidcombe and a small city area), on two occasions in eight others, and once only in forty-one other areas. The fifty-fourth area is an experimental eradication area of about ten acres, sprayed in 1951 and "spot" sprayed in 1952. This has since been surveyed eight times, without detecting any Argentine ants.

In the publicity campaign to induce people to forward ants for identification and so assist the Argentine Ant Survey, a 2½ minute colour film (35-mm. and 16-mm. prints) was produced for general screening in picture theatres. This film could have been a most effective method of stimulating public interest in the campaign, but much of its value was lost because it appeared just at the period of the decided swing from theatre patronage to television viewing.

VEGETABLE PESTS

Potato Aphid (*Macrosiphum euphorbiae*).—Tomatoes of the variety Rouge de Marmande were heavily infested with this aphid on the north coast in the July-September period, 1958. Routine application of DDT, for control of *Heliothis*, was relatively ineffective against the aphid—and separate aphicidal sprays of lindane or nicotine sulphate were required.

The widespread occurrence of aphids and the high incidence of yellow-top disease may have been related, as the disease is believed to be insect transmitted. Greenhouse studies, as a joint project with the Biological Branch, have been initiated to inquire into this problem, a serious one for coastal tomato growers. Attempts to transmit the disease to healthy plants by means of infective aphids have as yet not yielded positive results.

Oil Misting for Vegetable Pest Control.—Oil misting as a means of pest and disease control in tomatoes, beans and cucumbers was preliminarily tested as a joint experiment with the Biological Branch at Gosford. Two types of misting equipment were used, viz., "Fontan" and "Micronette"; and insecticide plus fungicide, in agricultural misting oil, were applied.

Insufficient infestation on tomatoes by *Heliothis* or tomato mite did not allow of effective evaluation of this method of pest control, but disease control seemed reasonably satisfactory. Some evident but unimportant foliage damage was experienced on tomatoes.

Bean looper (*Plusia* sp.) and bean blossom thrips (*Taeniothrips usitatus*) were well controlled by oil mist applications of TDE, but the beans (variety Brown Beauty) were susceptible to a severe type of leaf burn with the oil mist.

No conclusion could be drawn from the cucumber trials, owing to failure to get satisfactory penetration of the mist down amongst the foliage of the plants.

FRUIT PESTS

Codling Moth (*Cydia pomonella*).—Infestations were generally less severe than last year, but populations were quite high in some areas.

DDT is no longer uniformly effective against codling moth, and DDT resistance has been confirmed in strains of codling moth from the Bathurst area. There now appears to be a considerable degree of resistance to this insecticide in many orchards throughout New South Wales and probably a degree of resistance in most blocks.

Fortunately, some insecticides are now available which may be substituted effectively for DDT in the spray schedule; but many of these suffer from lack of residual effectiveness and are not as good as DDT at its best. However, Gusathion and Sevin, extensively tested in recent seasons, give promise of effectiveness as great as DDT.

Gusathion may be regarded as a complete insecticide for summer control of apple and pear pests. It will be top recommendation during the coming season. Whilst it is effective for control of codling moth, light brown apple moth, red spider and mites, it suffers the disadvantages of high toxicity and heavy residue.

Sevin, which has out-performed all other materials tested with the exception of Gusathion, is a safe insecticide. It controls both codling moth and light brown apple moth but is not effective against red spider. The element of insecticidal resistance developing is ever present, but possession of Gusathion and Sevin, two such powerful insecticides of widely different composition, should postpone for a worthwhile period the development of such resistance.

Light Brown Apple Moth (*Tortrix postvittana*).—The importance of this as a pest of deciduous fruits has developed only since replacement of lead arsenate by DDT in pome fruit spraying programmes. In the past season it caused considerable trouble in certain areas, and poor control was reported on a number of occasions where TDE spray programmes (which had been found specifically useful for control of this pest) had been applied.

Experimental application of TDE and Sevin late in the season, when larvae in all stages were present, failed to give any appreciable control; but programme applications, during the season, of TDE, Sevin, or Gusathion, gave very satisfactory control.

The organo-phosphorus materials, Ethion, Delnav, and Trithion were not promising.

Red Spider (*Tetranychus telarius*).—Conditions did not favour severe red spider development; although infestations built up in some orchards, especially where DDT sprays were used.

Programmes of organo-phosphorus sprays gave generally good control of red spider, although some cases of presumed resistance were encountered.

Kalthane gave very good control in all instances, including those where presumed phosphate resistance was concerned.

Fruit Tree Moth Borer (*Cryptophasa unipunctata*).—Observations indicated that occasional first year workings could appear as late as June. DDT miscible oil painted round the entrance to the larval tunnels did not give fully satisfactory control; a small percentage of borers surviving. DDT emulsion injected into holes gave complete destruction.

Green Peach Aphid (*Myzus persicae*), and **Cherry Aphid** (*Myzus cerasi*).—Autumn-migrant winged aphids were extremely abundant during late autumn 1958, and heavy egg deposition may be expected on susceptible hosts. It has been noted in other years that heavy, overwintering egg populations are not always followed by injurious infestations in the spring. It may be shown that application of winter ovicidal sprays can be dispensed with, and the spring infestations controlled by one of the very effective systemic insecticides now available.

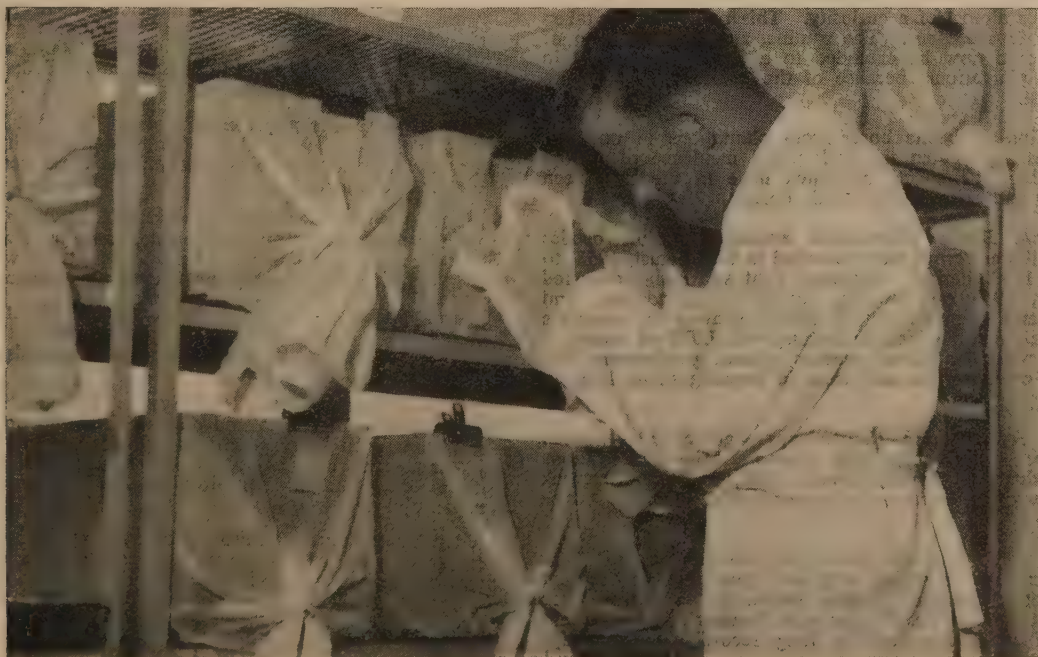
Red Scale (*Aonidiella aurantii*).—Development of red scale was rather heavy in some districts, especially late in the season; and in some instances heavy build-up followed the use of DDT sprays against fruit fly earlier in the summer.

Variable results followed grower-use of oil sprays and oil-malathion combinations, but faulty application techniques probably account for many of the failures.

Experimental work was continued at Yanco, where a number of new organo-phosphorus insecticides, some with systemic action, mainly in combination with white oil at low concentration, were tested against standard materials. They were applied as single February sprays. They included Rogor, Endothion, Phosdrin, I.C.I. experimental compound A7031, Ethion, Gusathion, Trithion, Malathion and several white oil formulations. Results have not yet been assessed.

White Wax Scale (*Ceroplastes destructor*).—Infestations were generally at a medium to high level, and summer temperatures were insufficient to cause any observed mortality.

Experiments at Kulnura were continued. The organo-phosphorus insecticides Gusathion, Ethion, Rogor, Phosdrin and Metasystox were tested. All were used in combination



“Cage-breeding of Fruit Flies”

At the Gosford Citrus Wastage Research Laboratory, Entomologists are cage-breeding fruit flies in the course of studying promising post-harvest treatments for prevention of fruit fly damage.

(Photo—Gosford Citrus Wastage Research Laboratory)

with white oil applied at normal timing against wax scale larvae on the leaves, with conventional equipment. At the same time the effectiveness of application of a standard white oil spray with an automatic air blast full-volume drive-past spray machine ("Attamist") was examined.

Metasystox proved the least promising of the organo-phosphorus insecticides used. Phosdrin appeared worth further testing. Results from other organo-phosphorus materials were comparable with normal full strength white oil sprays.

Results from the air blast equipment operated at full capacity were equal to those obtained by good hand spraying although tree top coverage may not be quite so satisfactory. Once again it was demonstrated that thorough coverage with sufficient gallonage of spray per tree is vital to successful results in scale control.

Citrus Gall Wasp (*Eurytoma fellis*).—It continues to be reported from farther localities in the County of Cumberland and coastal areas north of Newcastle, but no significant development has been observed in any of the main commercial citrus-producing areas.

In the Sydney district infestation is now known from about Sutherland in the south to Pymble in the north, and to Liverpool and Castle Hill in the west. Away from Sydney, along the coastal strip gall wasp is found as far north as Brooklyn on the Hawkesbury River but no further infestation is encountered before about Clarencetown. Individual infestations, probably taken on infested nursery trees from the Sydney district, have been discovered at Nowra, Wollongong and Muswellbrook, and a single isolated gall was found at Hornsby some miles away from the nearest known infestation.

A preliminary screening trial of insecticides was carried out at Oxford Falls, using clean transplanted lemon stocks. These were sprayed at various times, during the wasp emergence period in October-November, with a number of insecticides at a common concentration of 0.1 per cent. of the active ingredient. Owing to variability of shoot development, results were inconsistent; but only a few materials showed promise, viz., Phosdrin, Metasystox, Metaisosystox and Trithion. Unpromising materials were Gusathion, Ciba 570, Parathion, Diazinon, Thiodan, Endrin, Dieldrin and Malathion-oil.

Introduction and liberation of wasp parasites from north coast material, into heavy galled trees in the Sydney area, was again attempted. Some successful colonization from the previous years' parasite liberation was noted at one site.

Banana Beetle Borer (*Cosmopolites sordidus*).—Continued use of dieldrin, butt and ground sprays, has reduced this pest to the status almost of a curiosity. This reduction has taken place over four seasons. The routine, annual application of dieldrin, could now be extended to a 2-3 years interval in beetle-free plantations; because of the present low incidence of this pest.

Elimination of beetle borer from plantations in northern N.S.W. has highlighted the widespread incidence of a root rot condition, the effects of which have in the past been masked by and attributed to beetle borer.

Monolepta Beetle (*Monolepta australis*).—Adult beetles infesting different crops were recorded in the August, 1958, to February, 1959, period. Repeated light swarmings occurred in August, 1958 on flowering avocados, macadamias and mangoes; and good control of settled swarms on avocados at Duranbah was obtained by fogging with DDT-oil mixtures. Extensive swarms attacked peaches, plums, persimmons and numerous other shrubs and trees in home gardens later in the year.

Banana Rust Thrips (*Scirtothrips signipennis*).—Caused only minor fruit damage this season. Minor infestations occurred during February-March, 1959, in the Brunswick area, and scattered occurrences were reported from the Tweed district.

Annual application of dieldrin sprays to the bases of plants and adjacent soil in spring suppresses rust thrips movement until about December. Unless follow-up applications are made, fruit damage usually occurs in January and subsequent months in plantations with a long record of rust thrips incidence.

Banana Red Spider (*Tetranychus lambi*).—There were good early-spring rains and the customary build-up of red spider in banana plantations did not occur; but with drier conditions in October-December some heavy infestations were recorded in parts of the Tweed-Richmond, and, to a lesser extent, in

the Coffs Harbour area. Late in this period the Coccinellid predator, *Stethorus vagans*, caught up with the spider infestations and little trouble was experienced in January.

Several acaricides were tested against red spider, and the value of Kelthane, Phencaptone and Trithion was demonstrated.

The first full season's use of portable misting units for leaf spot disease control caused increased interest in red spider control. Previously this was not attempted on a wide scale, due to practical difficulties in high volume spraying application. In March-April, speckle disease was prevalent in all districts and was responsible for severe loss of foliage. The copper-oil combination for leaf spot control was relatively ineffective against speckle. The common belief (as yet unproved) of an association between speckle disease and red spider infestation added to growers' interest in the control of the latter.

Queensland Fruit Fly (*Dacus* (*Strumeta*) *tryoni*).—Except for a short period of dry weather in October-November, 1958, coastal rainfall was good throughout the year. This, with the mild winter, favoured fruit fly populations. Heavy infestations were recorded throughout spring, summer and autumn on the coast and, during late summer and autumn, in many inland areas. In fact, fruit fly incidence and severity this season reached an all-time high level.

In early spring, loquats and mature main crop grapefruit were heavily infested—followed by other fruits as they came to maturity. Heavy crops of intermediate oranges occurred in most coastal citrus districts, and out of season Navels became infested in December, whilst intermediate Valencia's commenced to suffer in January. Very heavy stinging of second-crop Valencia's occurred through January, February and March and main-crop fruits were also attacked in the latter part of this period. Summer lemons were also attacked during this period, and early Navels and mandarins were stung during March.

It was anticipated that very heavy attack on new season's Navel oranges would occur during late autumn but this was not realised in the main citrus districts, and fly populations fell away spectacularly in April-May.

In efforts to save the good-quality, second-crop citrus fruit, extensive bait spraying was carried out in the Gosford-Wyong district during summer and early autumn.

Very successful results generally followed the use of Malathion-protein hydrolysate bait sprays, and some packing house organisations insisted that growers supplying fruit to them should use this material. Despite some phytocidal effects following the copious use of this bait spray, growers and fruit handlers expressed great satisfaction with the results.

Where splash baiting with Malathion-protein hydrolysate was carried out on individual trees under home garden conditions, with heavy and persistent re-infestation, very large numbers of flies were quickly dropped and killed; but fruits were not satisfactorily protected.

During the year, changes were made in the Fruit Fly Regulations to include the use of Malathion-protein hydrolysate bait sprays and Dipterex cover sprays; and these were covered in a new Proclamation.

In an attempt to avoid foliage damage following application of protein hydrolysate plus insecticide, some tests were made with baits applied to bark. For best results it was shown that it is necessary to apply the bait to the foliage.

When applied to foliage, baits containing Malathion produced a more rapid kill of flies over a fortnightly period; whilst Dipterex showed promise for shorter periods of application.

Twelve different protein hydrolysates were further tested on early peach foliage, to find one which would not produce burning on Watts Early peach. Injury followed the use of all these materials, and when combined with malathion the hydrolysates giving the best drop of flies also produced the greatest injury.

A locally-produced chemical, para hydroxy benzyl acetone, prepared by Mr. A. Willison of Concord, together with some analogous compounds, was tested in a limited way. It showed some value as a male attractant for Queensland fruit flies.

Different methods of application of malathion-protein hydrolysate bait sprays were tested under tree cage conditions, using laboratory-bred flies and using the bait sprays at regular dosage. Results favoured the coarse droplet type of application, as from splashing with a large brush held in the hand. The deposit from a fine mist atomizer gave intermediate results, and a bark paint with more concentrated material was relatively inefficient.

A trial was carried out on 6 acres of apples and plums with Malathion-protein hydrolysate at $\frac{1}{2}$ lb. of each ingredient per acre, applied five times at weekly intervals, and using a Kiekens whirlwind mist blower. It showed that effective application of the bait could be made over the 6 acres whilst using as little as 4 gallons of liquid bait.

Using the same equipment on a block of twenty persimmon trees stinging was satisfactorily reduced by two applications of 1 lb. of DDT (in the form of Rucide), using 2 gallons of water. The resulting DDT deposit was long lasting, but marked the ripe fruits to an extent.

Following a demonstration of Rogor efficiency against fruit fly by a visiting representative of Fisons Ltd., England, some small-scale trials showed the effectiveness of this material against fruit fly larvae in peaches, apples, citrus, tomatoes and persimmons. As a result, tentative recommendations are: complete cover spraying with Rogor 0.04 per cent. four and three weeks before ripening of soft fruits, and with 0.08 per cent. eight and seven weeks before harvest of apples and citrus, for satisfactory control.

Some trials were carried out with organo-phosphorous systemic insecticides, to assess their value as inhibitors of maggot development in stung fruits when used as fruit dips.

Apples were dipped and artificially infested under laboratory conditions and outstanding effects were exhibited by the chemicals tested. Rogor 0.04 per cent. and Lebaycid 0.05 per cent. gave virtually complete inhibition whilst the effect of Endothion 0.1 per cent. was also very marked. The effectiveness of each of these materials was long lived—at least for four weeks under the conditions of the experiment.

Commodity treatment investigations with oranges were continued at the Citrus Wastage Research Laboratory at Gosford, where further trials of fumigation of artificially infested fruits with ethylene di bromide were carried out. At the standard fruit temperature of 70°F. clear correlation has been shown between uptake of EDB gas into the juice of oranges and the aim of 100 per cent. larval mortality. This correlation is regarded as basic for practical usage of EDB fumigation as a fruit sterilization method. However, difficulty is being experienced in controlling such juice uptake within useful figures. Preliminary work was carried out on the practicability of using EDB fumigation methods at temperatures lower than the standard 70°F.

Specimens of fruit fly infested peaches were received from Lord Howe Island in November, 1958, and the species was subsequently determined as Queensland Fruit Fly. A survey showed that the infestation had occurred in the previous season, and almost certainly through transport of fly-infested fruit from the mainland. A clean-up campaign was initiated by the Division of Horticulture, using Malathion-protein hydrolysate bait, and continued for some months; but eradication was not achieved. Ripening of a range of alternative host fruits, particularly guavas, made it clear that action on a much larger scale would be necessary if the project continued. This would include fortnightly spraying of the bait mixture by aircraft for a period of twelve months. It was impracticable, for financial reasons and lack of facilities for suitable aircraft.

Fruit inspections on Lord Howe Island revealed a new host record for the Queensland Fruit Fly; namely *Ficus columnaris*, the Banyan.

No fruit fly parasites were observed on Lord Howe Island and arrangements have been made for the C.S.I.R.O. to include the Island in their Fruit Fly Parasite Liberation programme. It is worth comment that the Lord Howe Island infestation affords an excellent opportunity to make precise observations on the efficiency of parasites, but subsequently also to test possible male annihilation or sterile irradiated male eradication techniques.

Vine Bud Mite (*Eriophyes vitis*).—In a further effort to determine the role of the bud mite strain of *E. vitis* in relation to erratic cropping behaviour in O'Hanez grapes, trials were laid down at Griffith in December, 1958, and January, 1959. These are to evaluate a number of insecticides, mainly systemics, for control of this pest. Results are not yet to hand.

San Jose Scale (*Quadraspidiotus perniciosus*).—This important pest of stone and pome fruit trees continues to cause concern, and reports of infestation have been received from a number of widely-separated areas.

Control measures recommended for dormant season application appear to be quite satisfactory, but there is need for a suitable recommendation for use during the growing season—to prevent the very rapid and damaging build-up which may occur after harvest and seriously injure the following season's fruiting wood.

Investigations into the biology and control of this scale have been commenced in the Murrumbidgee Irrigation Area.

SYSTEMATIC STUDIES

Aphids.—Systematic studies on this complex and unsatisfactory group have been undertaken; as no expert on this family of insects is known to be working in Australia, despite the fact that many species are important direct pests as well as capable of transmitting serious plant virus diseases.

At the request of the Forestry Commission of New South Wales a large series of aphids from various pines—cypress in particular—was examined and identifications were made. In all instances the species concerned was *Neochmosis juniperi*, and it is now believed that this aphid exerts considerable indirect influence on cypress pine regeneration in New South Wales. Previously it was thought that climatic factors alone were the major factors influencing growth of cypress pine.

Thrips.—Systematic studies on this group have been started and collections of material are being made to enable accurate redescription of named species and descriptions of unnamed species.

The Branch Collection is under review, and remounts have been made of poorly mounted material, and almost 200 slides of local species have been added to the collection.

A preliminary key to the Australian genera has been drawn up and will be modified as the situation concerning local genera becomes classified.

Weevils (*Curculionidae*).—Exploratory work for a special study of this important economic group of insects has been commenced and special attention has been given to building up the collection.

Data on species of economic importance have been noted and distribution of host plants is being determined.

Collection records indicate that a number of species overwinter under bark, chiefly of *Eucalyptus* spp. Amongst the interesting records are *Sitona concavirostris* Hochh (previously recorded from the Balkans to Siberia) noted, for the first time in Australia, as a pest of lucerne at Elderslie; and *Floresiana sordidus* Hustache, noted, for the first time since 1940, from several localities, in large numbers and attacking various garden plants.

UNUSUAL INSECT RECORDS

The following unusual insects were recorded during the year: *Dilochrosis atripennis*, Macleay, damaging figs at Wee Waa; *Alectoria superba* from Roto, Gunnedah and Forbes; *Acripeza reticulata* from Upper Hunter and Moss Vale; *Tropidoderus rhodomus* from Bourke, Paterson River and Willow Tree.

INSECT COLLECTION

The Entomological Branch collection of mounted and pinned insects now numbers approximately 200,000 Australian specimens. The collection ranks sixth in size in Australia and second to that of the Australian Museum in Sydney. Annual additions to the collection amount to about 4,000 specimens.

In addition, the in-spirit collection numbers almost 6,500, with an average annual increase of 250-300 tubes.

Micro-slides number in the vicinity of 4,000. These have recently been indexed and placed in new tray cabinets.

Chemist Branch

CEREAL SECTION

1958 Crop Year in re Wheat Quality Problems.—The season was in marked contrast to 1957 when drought conditions prevailed over most of the wheat-growing areas. Rainfall for the year was generally higher than average. Ample rain was received early in the season and weather conditions encouraged rapid crop growth, but early prospects of outstanding yields declined early in the latter half of the year because of frosts. These caused crop damage throughout most wheat growing areas. Damaged crops recovered to some extent but, as they approached maturity, stem rust developed in the northern por-

tion of the State, and an unusually severe dry wind caused extensive haying off of crops in the southern portion of the State and some parts of the western area..

The combination of damage by rust and wind, following the frost damage, was mainly responsible for the under quality wheat delivered to some 80 per cent. of the receiving points.

In 1957, 2,257,000 acres had been sown for grain production. Some 10,603,000 bushels were harvested; average yield, 4.7 bushels per acre. The 4.7 bushels average, however, did not represent the average of the area actually harvested. Slightly more than half the sown area either failed or was fed off to stock. In 1958, 3,100,000 acres were sown to grain. Approximately 66,000,000 bushels of grain were harvested; average yield, 21.3 bushels per acre.

The favourable 1958 seasonal conditions, compared to 1957, were reflected in the relative proportions of the respective year's grain crop delivered from the three wheat-growing zones of the State:—

	1957	1958
Wheat from Northern Areas	14.5 per cent. of the total.	17.5 per cent. of the total.
Wheat from Western Areas..	7.5 per cent. of the total.	50.5 per cent. of the total.
Wheat from Southern Areas	78.0 per cent. of the total.	32.0 per cent. of the total.

F.A.Q. Zonal Standards.—For the 1958 season, separate standards for f.a.q. wheat were struck for the northern zone and for the combined western and southern zones. As would be expected from the seasonal conditions, the general quality of the grain was slightly lower than that of 1957 f.a.q. wheat. For the latter, only one standard was established based on a combined sample.

Favourable conditions for growth of the crop during 1958 were reflected in slightly lower bushel weights and by the presence of some mottled grains in the samples.

Bushel weight of the northern f.a.q. sample was 62 lb. and of the combined western and southern sample 61½ lb., compared with 64½ lb. for 1957 f.a.q. wheat.

Protein Content.—Protein content of the 1958 northern f.a.q. sample was 10.9 per cent., and of the combined western and southern sample, 10.15 per cent, compared with 11.0 per cent. for 1957 f.a.q. wheat. Thus protein content of the 1958 northern f.a.q. sample is only about equal to that of the 1957 composite sample for the whole of the State, although 78.0 per cent. of the latter was delivered from southern areas.

Effect on Millers' Control of Flour Quality.—Protein content of the 1958 combined western and southern sample was approximately 1 per cent. lower than that of the northern sample. This was reasonably satisfactory. In effect, protein content of western and southern wheat was not so low that insuperable difficulties would be imposed on mills situated in western and southern areas, compared with those in the north.

Millers were gristing some imported grain of relatively low quality in the latter portion of 1958, and found difficulty in producing flour of a quality to satisfy the home market. The problems diminished when 1958 wheat became available later in the year. However, with high competition in the flour milling industry, inquiries continue to be received concerning the technical aspects of flour quality control.

Wheat for Special Purposes.—A combination of circumstances has rendered the flour milling industry more highly competitive. In trying to meet specific requirements millers increasingly find it necessary to purchase individual lines of wheat suitable for their own particular requirements.

Contraction of the export flour trade has made the local market more competitive, and millers have endeavoured to maintain their trade by improving the quality of bakers' flour and by expanding the production of high protein flour.

Flour for biscuit manufacturing covers a relatively wide range of quality requirements, and this market has not been fully met in the past from local wheat. More recently there has been a demand also for Durum wheats for macaroni manufacture.

Of wheat purchased for special purposes, the greatest demand is for high quality wheat suitable for milling into high protein flour or to raise the quality of ordinary bread-making flour.

As drought conditions in 1957 were particularly severe in northern areas, the amount of high quality wheat available that year was entirely inadequate to meet the demand, and millers did not have any stocks to carry over into the 1958 wheat season. When the 1958 harvest became available, millers were anxious to secure sufficient high quality wheat to meet at least their whole requirements for the year and, consequently, competition for the grain was very keen.

Premium Wheat—Record Quantity Purchased.—The amount of wheat purchased at a premium above the F.A.Q. price reached the record total of 6,191,680 bushels; compared with 1,108,655 bushels from the 1957 crop.

The average premium paid above the F.A.Q. price for wheat from the 1958 crop was 2s. 5.7d. per bushel, and the total amount of the premiums was £766,284, compared with an average price of 2s. 8.8d. per bushel for wheat from the 1957 crop, and total premium payments of £151,589.

The highest premium per bushel paid for 1958 wheat was 7s. 9d. per bushel, compared with a maximum price of 8s. per bushel for wheat from the 1957 crop.

Premium Wheat Growers' Association Effect.—The increase in amount of premium wheat purchased was due in no small degree to the operation of the Premium Wheat Growers Association in the northern portion of the State. This body was set up by farmers to assess the quality of their grain on delivery at receiving stations, to expedite sale of the grain. The Association had become established to commence operation during the 1957 harvest; but were unable effectively to do so, due to the low quantity of grain available.

Before the 1958 harvest commenced instruction was provided, in the Cereal Laboratory of the Chemist Branch, to staff appointed by the Premium Wheat Growers' Association to various grain receiving points.

Operation of the Association will stimulate further interest in wheat quality improvement in areas where it operates.

Soft Flour for Biscuit Manufacture.—The demand for this flour is not being met very satisfactorily by local millers. Representations have been made to the Department to take this demand into account when recommending new varieties for extensive cultivation by farmers. The Department has been informed of a possibility that wheat suitable for milling into soft biscuit flour may cease to be grown, unless steps are taken to ensure the contrary.

Preliminary survey has shown that suitable soft wheats are grown; but the grain loses its identity mixed with other wheats at points of delivery. It follows, that before any positive effort is made further to promote cultivation of soft flour wheats, maximum use should be made of such grain already being produced.

Soft flour wheats might be isolated from the F.A.Q. in southern areas, just as high quality wheat is isolated in northern areas.

Status of Durum Grain.—In recent years there has been a limited demand for the harder Durum grain; for milling into semolina, for manufacture of macaroni products. At present the demand for semolina for macaroni manufacture is being met largely from the harder, higher protein bread wheats. It is difficult to forecast at what level the demand for Durum wheats will become stabilised.

When requested, efforts have been made to help manufacturers secure grades of semolina suitable for their particular purposes.

Investigation of Wheat Grading.—Of the four major wheat exporting countries, Canada, U.S.A., Argentina and Australia, only Australia bulks all types of wheat together and markets one grade—under the "Fair Average Quality" system.

The F.A.Q. system has been modified a little; by marketing high quality wheat separately, at a premium above the F.A.Q. price, and in more recent years by declaring separate F.A.Q. standards for wheat respectively from northern areas and combined western/southern areas.

Purchase of premium wheat represents a system of grading for that class of grain. The wheat is isolated on the basis of quality, and handled separately. Grain delivered to the Grain Elevators Board, however, is bulked together at points of receipt; and, although wheat from northern areas is of generally higher quality than western and southern wheat, no attempt is made to separate the various qualities delivered at individual stations.

The Australian system of marketing as a mixed F.A.Q. sample has been criticised. Each type of grain loses its identity, being mixed with classes of grain of different quality

characteristics. If the various types of grain could be marketed separately, they would command overseas markets for which the mixed sample is not suitable.

Main reason a system of grading wheat at points of receipt has not been adopted has been that there is no ready method of recognizing the various quality types visually. Chemical determination would so delay receipt of the wheat that the scheme would become impracticable.

Funds for Research into Wheat Grading on Quality.—When funds became available under the Wheat Research Act the Wheat Industry Research Council allocated £4,000 to the Department to investigate the possibility of grading wheat on the basis of quality at points of receipt.

These funds were available in time to initiate the work during the 1958 harvest. Two assistants were appointed on a permanent basis and four were employed on a temporary basis, to collect samples and data under the general direction of an Analyst.

Some 4,000 samples of wheat were taken, at various receiving points throughout the State. They are being analysed to determine whether quality characteristics can be positively correlated with any physical character easily recognisable at a country elevator. When the samples were taken, information on the crop was sought from the farmer concerned; for consideration in the analysis of chemical data.

Information from the 1958 harvest will be valuable in planning further investigations.

Export Flour Quality.—During 1958-59, some 287 samples of flour were examined, for provision of export flour certificates; compared with 198 samples in 1957-58, and 504 samples in 1956-57.

The reduction in samples during the past two years reflects partly the contraction of the export flour market, and partly the shortage of wheat after the 1957 drought.

Grain harvested from the 1957 crop was not sufficient to meet even local requirements during 1958. Wheat had to be imported into New South Wales. Export of flour from the State was prohibited, other than to the Pacific Islands. This prohibition remained until the 1958 crop was assured. Actually, most of the samples for the year 1958-59 were submitted during 1959.

Some of the samples represented comparatively small tonnages; were submitted for certificated analysis on behalf of overseas buyers, as the export market is highly competitive. Some buyers have set specific or minimum standards in respect of quality.

Flour Examination for Government Institutions.—Fifty-five samples of flour were examined for Government institutions, for breadmaking purposes; compared with 52 samples in 1957-58. With minor exceptions the quality was uniformly high.

Cereal Instruction and Advisory Work.—Contraction of overseas demand for wheat and flour has stimulated millers and farmers to make maximum use of available technical knowledge to increase demand for their products.

In common with many other industries, the flour milling industry is finding it increasingly necessary to adopt rigid controls, to meet specific requirements of industries using their products.

High price of premium wheat means millers must make maximum use of high quality wheats available to them; and introduction of new wheat varieties has required assessment of their quality in the milling industry.

Assistance in Design of Cereal Laboratories.—Requests for this assistance have been received; also for advice on suitable equipment for flour quality control in mills. The present trend to integrate provender plants with flour mills, to make use of mill by-products, also puts emphasis on laboratory control of products. This is likely to expand considerably.

Farmers' Interest in Grain Quality.—Farmers' interest in their grain's quality has been stimulated by the decreased demand for wheat overseas. Several requests have been received to address farmers' organisations on wheat quality problems. These requests have been met so far as practicable. It is apparent that farmers are anxious to take advantage of recent years' higher incomes; to adopt improved farming practices—to stabilise satisfactorily the wheat growing economy.

Judging Show Wheats on Chemical Analysis.—This practice, in association with judging on physical characteristics of the grain, gives farmers the chance to learn how wheat is

assessed for various purposes. The wheat competitions at Sydney Royal Show continue to be of considerable interest in this regard; and country Show Societies—where they have access to the facilities—are also adopting the practice of analysing the grain chemically.

Two officers of the Chemist's Branch acted as judges and two as stewards in the competitive wheat classes at Sydney Royal Show, and an officer acted as judge of wheat at Narrabri Show.

General standard of Show entries was high. It is apparent that farmers do not submit samples unless of the opinion that chemical composition of their grain makes the entry worthy.

PESTICIDES SECTION

Cattle Tick Control Research

Cattle tick control investigations are being carried out by Analyst Mr. D. K. O'Neill, of the Chemist Branch, at the University of Sydney under the supervision of Professor A. E. Alexander. The current investigations are concerned with (i) Tickicide Stability Experiments, (ii) Physico-chemical Properties and Toxicity of Formulations.

(i) Tickicide Stability Experiments

(a) Standard Formulation.—Most of the work so far conducted has been concerned with Rucide, because this formulation has been more extensively used than any other. Rucide was used exclusively in the recent *eradication* campaign in N.S.W. It and other similar DDT formulations are still used in the *control* programme. The data compiled for the Rucide formulation were intended for use as a basis of comparison with other formulations.

(b) Effects of Salts, Clays and Soils.—The effects of salts, clays and soils upon the Rucide formulation have been quantitatively investigated.

When Rucide is initially dispersed in water, an unstable supersaturated colloidal form of DDT is formed, the DDT crystallises and aggregates on standing. Presence of various salts was found to influence the rate of aggregation of the DDT. Soils and clays also affected the aggregation process, and in some cases stabilised the DDT suspension.

(c) DDT Crystal Growth.—This was found to be promoted by the surface active agent present in the dip. Rate of growth was found to vary in proportion to the concentration of surface active agent. The effects of salts, soils, and clays, on aggregation and crystal growth, were connected with their influence upon the surface active agent and the charge on the DDT particles.

(ii) Physico-chemical Properties and Toxicity of Tickicide Formulations

Experiments have been commenced to clarify relationships between physico-chemical properties and biological efficiency of various formulations. Laboratory experiments in Sydney with cattle ticks (*Boophilus microplus*) were not possible, because of quarantine. In-vitro dipping experiments have been conducted with bush ticks (*Haemaphysalis bispinosa*), sent from Bangalow in northern N.S.W., and flour beetles (*Tribolium confusum*) bred in the laboratory. The following is a summary of the work so far:—

(a) Flour Beetles.—(i) Water alone does not wet the beetles—a small quantity of surface active agent is necessary to wet them. Wetted beetles are temporarily prostrated after dipping. (ii) Commercial BHC dispersible powders usually do not contain sufficient surface active agent to wet the beetles uniformly; erratic probit—concentration curves resulted. (iii) Addition of 0.32 per cent. Rusol (Sulphated butyl oleate, originally termed "Brinol") caused partial detoxification of Rucide, Deetik and BHC dispersible powder. However, the addition of 0.32 per cent. Timbrol's surfactant caused intoxication of the Timbrol supercooled melt formulation. (iv) Deetik is more toxic than Rucide when the suspensions are first prepared; this checks with bush ticks.

(b) Bush Ticks—Preliminary Tests (1957-58).—(i) When freshly prepared, Deetik appears to be more toxic than Rucide. Rucide, Timbrol's and Nightingale's formulations appeared similar in toxicity at one concentration (0.5 per cent. p.p.—DDT) when initially dispersed. (ii) BHC commercial dispersible powder and pure gamma-BHC were both detoxified

by the addition of 0.32 per cent. Rusol, but not greatly influenced by 0.32 per cent. Aerosol OT. Absorption of the surface active agent by the filler clay, solubilization of the BHC, and draining, appeared to be important factors.

Present Tests (1958-59).—(i) A more comprehensive series of aging experiments measuring the L.C.50's and the DDT deposited per tick has been completed, for periods of up to 28 days, for four commercial formulations of DDT. These were Rucide, Timbrol's, Nightingale's and Deetik. The first three are of the supercooled melt type, and the latter a dispersible powder. On aging, the dispersible powder was relatively unaffected in its L.C.50 and its deposition on the ticks; also the additions of bentonite clay and salt to the suspension did not cause appreciable change. However, the three other formulations on aging increased considerably in toxicity and showed increases in the amount of DDT deposited on the ticks. At present, it is thought that the DDT crystal size is the main factor responsible for these changes in toxicity and retention of the DDT. Additions of both bentonite clay and salt were found to modify the increases in toxicity and deposition of the formulations. (ii) The effect of added surface active agent (0.32 per cent. Rusol) on two formulations of commercial BHC dispersible powder was again examined. In each case the surface active agent decreased the toxicity of the formulations. It is believed that the filler clay in the formulations, and the grade of BHC, and other properties, influence toxicity; since, in these formulations, the one based upon diatomaceous earth (I.C.I.A.N.Z.) appeared to be more toxic than the one based upon kaolinite (Lane's). Further work on these aspects is required. (iii) Preliminary experiments to find differences in toxicity of various sources of supply of arsenic, and also differences in toxicity of oil in water emulsions and supercooled melt formulations of DDT, were commenced.

Removal of Spray Residue from Pome Fruit

Investigations proceeded, though not as rapidly as hoped. An extra Analyst, to work exclusively on the analysis of spray residues, commenced duty on 24th November, 1958.

The fruit washing machine to be used for tests on removal of spray residues is expected to be installed at Bathurst Experimental Farm about the end of August, 1959, too late for experimental work on the 1959 crop.

Determinations of mercury, DDT, lead and arsenic on apples from the 1958 harvest, from Batlow, Orange, Leeton and Griffith, were made by November, 1958. Work then commenced on the determination of captan and malathion on 1958 season samples which by this time had been in cold storage for a long period. The results for captan and malathion were both very low. It was not known to what extent the results were affected by the long storage period, but figures obtained so far for the 1959 crop appear to confirm those for 1958.

In 1959 samples of both apples and pears were obtained from the same areas mentioned above, using a new sampling plan. This had been worked out for the sampling of fruit of any particular variety in an orchard. Each sample was made to consist of three replicates, each of 16 fruit, selected in a systematic manner from the four quadrants (N., E., S. and W.) of the trees and at various heights. Each replicate was collected in a polythene bag, and kept therein until required for analysis.

Determinations made so far on 1959 season fruits include malathion, captan, DDT, ziram, and TMTD. In most cases the residue is very low, and well within overseas tolerances.

Preliminary investigation of a method for determining gusathion has been carried out; analyses of gusathion residues will soon commence.

Methods have still to be developed for determination of many other pesticide residues.

B.H.C., Grasshopper Control Specifications

Original specifications drawn up by Chemist Branch for supply of 7 per cent. gamma BHC emulsifiable concentrate for plague locust control have been modified to include a clause on oil-miscibility, to permit dilution with diesel oil for aerial spraying.

In addition, specifications have been further modified for supply of a 15 per cent. gamma BHC, oil-miscible, emulsifiable concentrate. This is more suitable for use in the new micron sprayers, and for aerial spraying.

DDT content of Dairy Products

Analysis of DDT content of butter and milk continued, to determine possible toxicity hazards arising from dipping dairy cattle in DDT dips for control of cattle tick under various conditions.

Current investigations involve comparison of two different formulations of DDT, to assess the influence of formulation on resultant DDT content of milk.

New Methods of Analysis

Application of new methods for the analysis of pesticides continued, especially micro-methods suitable for determination of spray residues.

A very useful colorimetric method has been developed, from the literature, for evaluation of copper fungicide deposits on foliage. It is quick, reliable, and can be applied to leaves as such—thus eliminating time consuming ashing techniques. The colour reagent used, Bis-cyclohexanone oxalylidihydrazone, was synthesized in the Chemist Branch.

Extension Information on Pesticides/Fungicides

Advice has been given to farmers, field officers, etc., regarding properties and uses of the many pesticides on the market, and the practicability of using various spray mixtures in the field.

Cases of damage to foliage and fruit following spray application have been investigated for growers.

A rather common occurrence has been damage to banana fruit following dipping in salicylanilide dips for fungus control. Damage to the fruit is rapid blackening of the skin followed by rapid breakdown of the fruit. The damage has almost invariably been traced to arsenic contamination in the dip.

Regulatory

Analyses of various products have been conducted under the Pest Destroyers Act, and the Stock Foods and Medicines Act, as a check on manufacturers' specifications. These checks usually result from complaints by growers or field staff. They serve to maintain a reasonably high standard in manufacturers' products.

Standards

The Branch has continued to be represented in the Australian Standards Association committee set up to prepare specifications for and methods of analysis of insecticides, fungicides and herbicides.

Oil Wraps for Apples.—Samples of oil wraps were examined to determine their oil content. In all cases the oil content was below the level desired for protection from incipient scald of Granny Smith apples in cold storage.

WATERS SECTION

General Water Analyses.—Demand for water analyses continued at a high level. Twelve hundred water samples were analysed and typed advice was given as to their suitability for stock, irrigation and domestic use. In addition, numerous enquiries re problems of purification, etc., were dealt with. No outstanding delays occurred. The "while-you-wait" service initiated in 1957-58 was expanded to meet all demands.

Research into Techniques and Interpretations.—Further research has yielded a very full and valuable assessment of water quality. The laboratory report in current use gives comment as to suitability for various farm uses, and suggestions as to possible hazards and counter measures.

Prototype "Salinity Meter."—This has been produced for use in the field by farmers, orchardists, extension officers, etc. Negotiations are proceeding with a manufacturer re production, sales, and distribution.

From funds made available from the Dairy Industry Extension Grant and the Agricultural Extension Grant, meters were purchased for location at field offices in each of the Department's nine Agricultural Regions. This expansion of the Department's water testing service, which has provided inestimable service to landholders for many years, has been planned primarily to enable "on the spot" tests of irrigation and stock waters to meet urgent demands. The equipment has been enthusiastically praised by landholders.

The small water testing meters intended for purchase by landholders are of the transistor type, battery operated. The development is an outcome of co-operation between the Chemist Branch and a Sydney firm of electronic engineers.

Fluorine Analyses.—Owing to problems associated with difficulty in obtaining staff and facilities for analytical work no fluorine analyses were carried out this year. The Fluorine Survey project has been in abeyance for the year for staff reasons.

Clarence River Basin—Salinity Project.—In response to a resolution from the North Coast Agricultural Region's Advisory Committee, an "on the spot" investigation of salinity of waters in the Clarence River Basin was undertaken.

Demonstrations of the analytical techniques involved were given to landholders, etc., and some 63 samples of water were analysed. A report was furnished to the Committee.

The samples were from wells, creeks, swamps, and from the Clarence River at various points. Salinity levels varied greatly—from 15 to 760 parts saline matter per 100,000 of water.

Murrumbidgee Irrigation Areas—Salinity Project.—Samples of M.I.A. water were analysed and reported on, and soils from "salted" areas were examined by solution conductivity techniques. The results were discussed with regional officers. A foundation has been laid for further work on soil salinity problems of the area.

DAIRY INDUSTRY SECTION

Cleansers and Sterilizing Agents.—These as used in butter factories were examined and analysed in accordance with problems encountered.

Neutralizing Agents.—Agents used for neutralizing cream for butter making were examined and analysed.

pH Status of Stored Butter.—pH status was examined to correlate "off" taste with pH and other factors.

"Filled Milk"—Technical information for legislation concerning "Filled Milk" was collated and supplied to the Legal Officer.

Margarine Survey.—Margarine samples submitted by the Division of Dairying were analysed, and a report was furnished re colour, flavour, and proximate composition, and details of wrap pack, etc. This investigation was prompted by a statement attributed to the Tasmanian Minister for Agriculture concerning certain margarines and spreads produced by firms in New South Wales.

PHYSICAL CHEMISTRY SECTION

Radioactive Isotope Work.—The experimental work on the project with radioactive P-32 commenced during the previous financial year in conjunction with Dr. Davey (resigned, now a Lecturer at University of Sydney) has been completed. Publication is awaiting the convenience of Dr. Davey. Acknowledgments are due to Dr. Green of the University of New South Wales for placing his laboratory at our disposal.

University of Sydney arranged also for Dr. Redies of the Chemist Branch to give a course of six lectures on isotopes in agriculture to the students of Agricultural Chemistry. Members of the Faculty also attended these lectures. A further course of lectures is proposed for the ensuing year.

Further immediate work with radioactive isotopes will of necessity be restricted until the Department is able to provide laboratory facilities and equipment.

Several officers of the Department of Agriculture have intimated their desire to use radioactive isotopes in their investigations. Diverse nature of their interests has laid emphasis on the fact that if the isotopes laboratory is to provide an adequate service it will require to be well equipped.

Preliminary consideration is being given to the feasibility of applying radioactive isotopes to certain investigations by the Entomological Branch, this Division. If the consideration is favourable, work in this field will be initiated shortly.

SOIL SURVEY UNIT

Soil Fertility Investigations—Bellingen River Valley.—Six visits to the trials were made by officers of the Chemist Branch. Some 450 soil samples for available nitrogen studies were collected, at two-monthly intervals throughout the year; 300 soil samples for phosphate analyses; and over 300 pasture samples were also collected.

Three extractants have been employed in an attempt to establish a correlation between "available" soil phosphorus and plant response. Olsen's bicarbonate (0.5 M NaHCO₃) extractant has given better correlation than the two dilute acid extractants of Bray and Truog.

Results so far show that the 2 cwt. per acre superphosphate treatment increased the yield of Ladino white clover significantly, whilst the 6 cwt. per acre treatment was responsible for a marked depression of the yield—probably due to nitrogen becoming a limiting factor in plant growth.

A mass of data on nitrate and ammonia nitrogen from these soils is now being analysed. This nitrogen work is a preliminary phase. Further work is planned, to discover how the ability of the soil to produce nitrate and ammonia varies throughout the year.

Soil Fertility Investigations—Gosford Citrus Areas.—Many mineral deficiencies occur in the sandstone soils of Gosford district, and soil tests to indicate these are desired. However, soil testing for these presents difficulties due to interactions of one element upon another in plant metabolism. A start has been made, but a quick answer is not expected.

The officer on the project has gained background information, to facilitate study of nutrition problems, by studying the soils of the district—in particular those at Somersby Section and Narara Section of the Gosford Citrus Research Station.

Soil Fertility—Hawkesbury River Flats.—In this badly salted area the problem has reduced itself to that of devising satisfactory reclamation procedures, involving tile drain depth and spacing, measures to prevent dispersion of the soil when salt is being removed, and allied measures. This is specialist work. Accordingly, the Soil Survey Unit has temporarily seconded one of its young officers (Mr. G. Evans) to Sydney University to study this problem under Professor Collis-George. The experience will equip him to tackle many soil physics problems in the State on his return to the Chemist Branch.

Phosphate Work, in W.U.F.T. and U.P.S.E.T. Trials.—These trials (designed by Division of Plant Industry to give a picture of the response to nitrogen, potash and phosphate fertiliser by wheat and pastures throughout the State) provide a chance to correlate soil phosphate tests with plant response on a wide variety of soil types. Accordingly, samples have been collected and are being analysed for phosphate. The coming year will see an extension of this work.

Factors in Phosphate Uptake by Kikuyu Grass.—Investigation of the influence of soil temperature and moisture content on phosphate uptake, by Kikuyu, commenced when the Kikuyu trials were laid down at Bellingen. It is not now being continued by the Unit, since Dr. Davey, who is doing the work, is at the University of Sydney.

The work is continuing at the University of Sydney. Results to date indicate that temperature has a marked effect on phosphate uptake. So, too, does moisture stress.

Soil Survey—Rylstone-Mudgee Area.—Some 200 square miles was covered in a broad reconnaissance survey to serve as a basis for further field and pot trials by the Plant Nutrition Section of the Chemist Branch. The soil pattern is broadly similar to that found by van Dijk in the Monaro Region.

Soil Survey—Bourke.—A small area (2,000 acres) at North Bourke was surveyed in some detail at the request of the Western Lands Commission, to determine its suitability for irrigation land use—possibly an extension of tobacco growing.

Soil Survey—Tamworth Experiment Station.—Some detailed surveying was done over small areas on Tamworth Experiment Station, to assist the plant breeders in selection of areas of uniform soil for testing new varieties of wheat. The pattern of soils is very complex, and a district study is required to elucidate the pedology of the Station soils.

Soil Survey—Gundagai.—New areas were examined for proposed extension of asparagus culture at Gundagai, on Murrumbidgee River flats.

Soil Survey—Menindee.—Some 20,000 acres were surveyed at reconnaissance level, to indicate their land-use potential. This is in addition to the 5,000 acres surveyed last year. For some time the Menindee growers have not been able to sell their vegetables profitably on the Broken Hill market. The need to put market gardening at Menindee on a sounder basis necessitated the survey. Generally, the soils are light-textured types in dune formation, similar to the mallee country.

Analyses of Farmers' Soil Samples.—Routine analyses were continued, and one officer has been employed full time on this job for several months.

Analyses for Other Divisions and Branches.—These continued, with a growth in co-operative projects.

Staff Changes in Soil Survey Unit.—Drs. Davey and Storrier left the Chemist Branch staff during the year. Dr. Davey to the position of Lecturer in Soil Science at Sydney University,

and Dr. Storrier to a Research Officer position at the Agricultural Research Institute, Wagga. Mr. P. Collin, a Soil Chemist with the Unit for a number of years, left to join the N.S.W. Department of Health.

Three new graduates were appointed.

PLANT NUTRITION SECTION

Increase in Samples for Analysis.—Over the last three years there have been dramatic increases in numbers of samples analysed. Plant Nutrition Section co-operates very closely with the Divisions of Plant Industry and Horticulture. The number of analyses in 1958-59 reflects this.

Approximately 11,000 analyses were done, including some 5,000 nitrogen, 2,000 phosphate and 500 potassium determinations. In addition to these three major elements, many analyses for magnesium, calcium, manganese, sodium, molybdenum, boron, copper, sulphur, and zinc have been made. The number of determinations in 1957-58 exceeded 9,000, and in 1956-57 exceeded 4,000. These figures clearly indicate the marked rise in output of analyses.

Use of mass production techniques and detailed attention to improvements in laboratory methods, have assisted considerably in achieving the high output.

New Methods of Molybdenum Determination.—Methods for molybdenum determinations have been modified to meet the requirements of the maize nutrition project—an important one involving field, pot, and laboratory work. The previous method was unsatisfactory for the determination of molybdenum in the leaf of maize because the leaves contain high levels of silica and very low levels of molybdenum—some as low as .008 p.p.m. A suitable wet-ashing technique has been developed for analyses of maize leaves.

Spectrographic Calcium Determination, Modified.—It has been usual in this determination to dilute the plant material extract, approximately 500 times, prior to filtering. The extract was filtered prior to dilution, but there was some absorption and loss of calcium. Calcium recovery has been improved by filtering after dilution.

Zinc Determination.—Considerable work has been directed towards improving the current time-consuming method, but a more satisfactory method has not been found. A Chemist Branch officer at present in California has indicated that speedier and more accurate methods for zinc and sulphur determinations in plant material have been adopted there. It is proposed to examine these in detail.

Salt Toxicity Diagnoses.—Damage due to salt toxicity is likely to occur in any part of the State. Some crops are much more susceptible than others. A wide range of crops suffers in a wide range of areas. The soil salt excess may result from seepage, high water table, salty irrigation waters, or cyclic salt.

Fruit trees have been affected in nearly all parts of N.S.W., but particularly the M.I.A. Crops such as maize, cabbages, potatoes, canning peas and chokos, have suffered in many areas, including Richmond, Maitland, and the M.I.A. Among the ornamentals, roses seem to be particularly susceptible. Affected roses have been submitted from Picton, Yeoval, Sandy Hollow, Mosman, The Entrance and Aberdeen.

Salt damage is frequent where the soil appears to have relatively low salt content. In many cases, salt may accumulate on the leaf surface, either from sea spray (cyclic salt) or irrigation spray, and concentrate by drying—with subsequent injury to the plant. Invariably in such cases a soil test reveals little or no salt.

Whilst the classical symptoms of salt toxicity are often apparent to extension workers, these symptoms may be masked by other deficiencies or environmental conditions. Extension workers are therefore very keen to have suspected plants quickly and readily diagnosed for excess salt.

To meet the demand of extension workers, salt analysis is given high priority—analysis almost the same day as received.

Spectrographic Analyses for Calcium, Manganese, Potash, Magnesium and Sodium.—Many interesting results have been obtained on routine samples. A few highlights are outlined below:—

(i) Potassium deficiency.—Lucerne growing for hay has been a major activity in Tamworth district for years. Large quantities of hay have been produced from some of these soils. They are extremely fertile. However, there is spectrographic evidence that potash deficiency is developing in some of the lucerne stands.

Potassium deficiency was also diagnosed in Subterranean Clover, Taree district. The figures are interesting. The amount of potassium recorded in the Subterranean Clover from Taree was 0.3 per cent. McNaught, New Zealand, claims that 1.8 per cent. is a critical level of potassium in Subterranean Clover.

It is of interest, too, that in addition to the very low figure for potassium in Subterranean Clover at Taree, there was a high sodium accumulation of 1.35 per cent. It has been recorded elsewhere that sodium may partially replace potassium in the physiology of the plant.

(ii) Manganese toxicity.—Some samples of citrus leaves from trifoliata stock were analysed. They contained approximately 200 p.p.m. of manganese. This, on other stocks, would probably be quite satisfactory. On trifoliata stock it is thought to be a toxic level.

(iii) Hypomagnesaemia.—Chemist Branch is co-operating with the Division of Animal Industry, at Glenfield, on the hypomagnesaemia problem in dairy cattle at Kangaroo Valley. Magnesium and calcium determinations are regularly carried out on the clover plants being studied in a project to determine the cause of hypomagnesaemia.

(iv) Boron.—(a) "Barren ears" in maize. "Causes" reported for this condition include physiological factors, low boron, low phosphorus. Two samples from two different sources were submitted to the Chemist Branch. One showed very low boron and the other very low phosphorus. Further investigations are being made co-operatively with Division of Plant Industry.

(b) Asparagus.—The Plant Nutrition Section has been co-operating with a commercial firm in a nutritional experiment. Plots of asparagus were treated with rates of borax varying from nil to 60 lb. per acre. Asparagus plants from the particular plots were analysed. Uptake of boron in the analysed crowns, roots, rhizomes and stems did not vary over the range of borax dressings. However, in the ferns it ranged from 35 to 81 p.p.m. The fern is apparently the most suitable part of asparagus to take, to show up variations in boron availability.

Maize Nutrition Studies: Molybdenum Effect.—Considerable work in the Plant Nutrition Section has centred around the nutrition of maize. In Taree district, some years ago, attention was drawn to molybdenum deficiency symptoms in maize. Hybrid maize, seed from certain areas, tended to exhibit deficiency symptoms when grown on soils with a low molybdenum content.

The maize studies have been carried out in pots and in the field and laboratory. The early pot work, to diagnose the symptoms as reported in the field, established that the "yellowing" and curling and scorching of the leaf edges was associated with molybdenum deficiency in the seedlings.

The second phase of the work was carried out in conjunction with laboratory work. In a survey of hybrid maize seed grown on 20-odd farms it was found that some of the molybdenum content of the seed grown on these farms was extremely low. The lowest level was 0.002 p.p.m. It was also established that 0.08 p.p.m. was the critical level and the grain with 0.1 p.p.m. did not show any molybdenum deficiency symptoms.

Methods for control of molybdenum deficiency in maize were also studied. It was found that the soluble molybdenum was considerably more effective than the insoluble molybdenum. Rates of molybdenum were also tested in the glasshouse and in the field. Uptake of molybdenum was measured in the leaf and in the grain at the 2-oz. and 16-oz. per acre levels of application. It seems certain that the application levels used for pasture are insufficient to correct a deficiency in maize.

It was thought that varieties of hybrid maize may have different molybdenum requirements. In some earlier work one maize sample in particular showed a very high uptake of molybdenum. Further work has indicated that there is no inter-varietal difference in susceptibility to molybdenum deficiency.

Field work has been carried out at Wallacia, Kangaroo Valley, Grafton, Taree and Camden on molybdenum in relation to hybrid maize. Crops of hybrid maize have been grown and treated with various forms and rates of molybdenum. The grain, and in some cases the leaves, from these trials, have been analysed in an effort to establish the effectiveness of molybdenum treatments in correcting low molybdenum content in grain.

Lucerne Nutrition Study.—A lucerne trial treated with rates of molybdenum and lime in factorial combination was established some years ago at Campbelltown. The plots are on a soil not regarded as suitable for lucerne, but some of the results are quite interesting.

In contrast to Subterranean Clover, which responds to low levels of lime, lucerne frequently shows a much higher requirement. The lucerne grew well with $\frac{1}{2}$ ton of lime per acre and did best in plots treated with 1 ton of lime per acre plus 2 oz. of molybdenum trioxide. Higher rates of molybdenum did not give any further response.

Results in glasshouses support the field results, viz., that in areas requiring lime, lucerne requires at least $\frac{1}{2}$ ton per acre of lime and will respond to lime at higher rates. It was found that 1 ton of lime did not take the place of molybdenum, but good responses were obtained with 2 oz. of molybdenum, even with 3 tons of lime per acre.

Phosphate Studies.—Phosphate determinations have been carried out on clover samples from trials at various centres including Wyong, Berry, Tia, Coonabarabran and Campbelltown. There is strong evidence that many of the clover plants before flowering should contain approximately 0.2 per cent. P. Once the clover plants have flowered or hayed it is not possible to obtain a critical level of phosphate in the plants.

There has also been an attempt to work out the phosphate recovery of some of the pastures. At Berry, phosphate determinations were made on lucerne, white clover and Subterranean Clover under conditions where plots sown to these clovers were treated with various rates of phosphate. Some were allowed to grow through to the hay stage and others were cut regularly at a certain height.

Phosphate recovery was extremely poor when the plants were harvested at the hay stage and was considerably better when the plants were regularly cut to simulate grazing conditions.

This experiment is being continued, aimed to work out the most economical phosphate dressing, in relation to cost and recovery, under the conditions at Berry.

Uniform Pasture Survey and Extension Trials.—Representatives of the Plant Nutrition Unit, Chemist Branch, have been in the intra-departmental planning committee for trials, known as "U.P.S.E.T.", to be located throughout the State. Chemical work will be carried out on samples from these trials as they are harvested. There will be many hundreds of trials. (Further information in respect of U.P.S.E.T. will be found under "Division of Plant Industry".)

Surveys of Nutrient Status of Crops.—Surveys of the main nutrients in apple leaves have been done in the Orange and Oakdale districts on Jonathan apples during the months of December to April. In agreement with overseas results, there is considerable variation in the N.P.K. status of leaves during these months.

Leaves from the Orange and Oakdale districts are being compared. The nutrients are very much higher from the orchards in the Orange district than those in the Oakdale district. The causes may be numerous, but rich soil at Orange is one factor.

Citrus Nutrition Research.—Plant Nutrition Section is co-operating in a citrus nutrition experiment at Narara Section of the Gosford Citrus Research Station, with Dr. Kiely, of Biological Branch, this Division, and Horticulture Division. There are 96 trees in pots ($\frac{1}{2}$ ton of soil in each pot). The trees have been treated with 2 rates of nitrogen, potash, calcium, magnesium, copper and zinc, and 3 rates of phosphorus in factorial combination.

The leaves were sampled and washed in January, 1959, according to recognised methods. These leaves are being analysed for the nutrients listed. Results of analyses are to be indexed and studied in conjunction with such data as yield, tree growth and quality of fruit, etc.

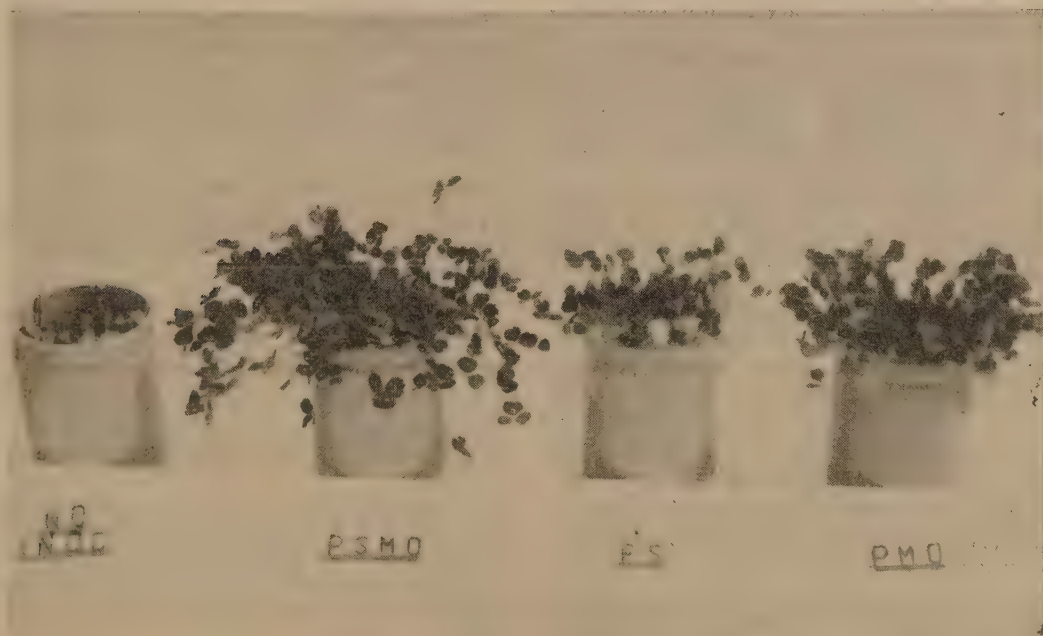
Early results of leaf analyses indicate, among other things, that uptake of lime may be effected by large dressings of potash, magnesium and nitrogen either alone or in combination.

Citrus pot experiments were also established at Hawkesbury Agricultural College to examine the effect of rootstocks on the uptake of manganese and salt, and also to study the methods of controlling the uptake of these minerals.

Apple Measles.—This condition in Delicious apples has been studied in many parts of the world. The cause is still unknown, but has been attributed to a number of factors including manganese toxicity. The Victorian Department of Agriculture has been investigating a measles condition in apples and pears and concluded that manganese toxicity can be a cause of such a condition.

To investigate a condition described as Apple Measles, in the Orange district, samples of the leaves, bark and fruit from affected trees were analysed by both the Victorian and New South Wales Departments. Results indicate no relation between the condition at Orange and excess manganese.

Quality of Magnesite and Dolomites.—There is a considerable amount of magnesium deficiency on coastal crops such as vegetables and in citrus soils in the Irrigation Areas.



"Some Essential Elements Were Missing"

Pot experiments with soil samples from Grafton district, and associated Chemist Branch analyses, have shown clover response to Rhizobium inoculum (INOC) supported by phosphorus (P), sulphur (S) and molybdenum (MO) additives. All are there in the pot second from the left.

(Photo.—Chemist's Branch)

Advisory work is carried out on the quality of magnesite, dolomites, and limes; based on samples frequently submitted to the Chemist Branch.

Supplies of quality dolomite are extremely limited. In fact, there is no regular dolomite producer in New South Wales. The Department of Agriculture has been recommending the use of lime plus magnesite to replace dolomite.

Sulphur Availability to Clover; Effect of Fineness of Grinding.—Realisation of the importance of sulphur in pasture has in recent years directed attention to different forms of sulphur fertilizers for pasture. Although flowers of sulphur has been used in experimental work for many years, little use was made of elemental sulphur by farmers until the last 12-18 months. During this period the value of ground sulphur in sulphur fortified superphosphate has awakened considerable interest. Elemental sulphur is the finest commercially available form but ground sulphur is generally coarser. It has therefore been important to determine the availability, to clovers, of elemental sulphur of varying degrees of fineness.

An experiment was conducted to determine the availability of the different mechanical fractions of ground elemental sulphur, compared to gypsum and flowers of sulphur. Sulphur analyses of harvested clover tops and dry weight yields have been determined and recoveries of sulphur from each grade of sulphur calculated. Results indicate that only the finest grades of ground sulphur have any appreciable immediate availability to clover under the conditions of the experiment. More extensive glasshouse experiments have already been undertaken in the 1959 season, and it is hoped to commence field trials.

Residual Effect of Phosphorus and Sulphur in Superphosphate.—Phosphorus and sulphur investigations have been carried out in a large-scale series of field trials at Tia, co-operatively with the Division of Plant Industry. Plant analysis has been used extensively in the interpretation of the sulphur and phosphorus stories from this series of trials. Glasshouse work has now been called upon to help elucidate and confirm findings in the field.

Some of the field trials indicated that, under the soil and climatic conditions in this area, sulphur had only poor residual effect and that perhaps sulphur applied as superphosphate had a lower residual effect than the phosphorus. It was possible to obtain two soils within a few feet of each other both sown to Subterranean clover four years ago. One had received a heavy initial dressing of superphosphate and the others received no fertilizer treatment.

An experiment with different rates of phosphorus and sulphur was conducted on the fertilized and virgin soils, to determine the residual effects of the sulphur and phosphorus applied in the initial heavy dressing. Results indicated no residual effect from sulphur, and low residual value of the phosphorus.

Sulphur Requirements of *Phalaris*, *Subterranean Clover* and *Lucerne*, compared.—This was a glasshouse comparison. Most notable result was the apparent lower requirement of the grass than that of the legumes. The influence of the level of nitrogen fertility on the sulphur requirement of *Phalaris* was conducted as a corollary experiment.

Biuret in Urea.—With increasing use of urea as a nitrogenous fertilizer there has been increasing awareness of the importance of biuret impurity, toxic to plants, derived from the condensation of two urea molecules during manufacture and pelleting processes.

Certain sources of urea have consistently a higher biuret contamination, related to the temperatures used in processing.

Some crops, particularly citrus, are very sensitive to biuret. Increasing use of nitrogenous fertilizers on pastures has also posed the question of the effect of biuret on pasture components.

Glasshouse experiments were conducted on rye grass and citrus, using different amounts of biuret added to pure urea.

Rye grass was not affected by biuret present in amounts found in commercially available urea. Only when more than 10 per cent. biuret contamination occurred was there any measurable suppression of growth or evidence of toxicity.

Citrus was much more susceptible. Both spray and soil applications were tested and, in keeping with overseas findings, there was a much lower tolerance to biuret contamination for spray applications to citrus than where the urea was applied to the soil.

Glasshouse, Plant Nutrition Surveys.—The important soils of several districts have been established and the fertilizer requirements of these soils are being determined in the glasshouse.

Five soils from the Bellingen area, seven from the Clarence area, five from the Rylstone area, six from the Far West, and eight from the Manning district, have been tested by a standard routine survey, glasshouse trial; with follow-up experiments whenever necessary.

The systematic approach is providing a more accurate and complete picture of the fertilizer needs of all the important soil types within the respective district than has been possible hitherto.

Extension Work, on Plant Nutrition.—Members of the Plant Nutrition Section continue to engage in extension work. This year, lectures have been given at Oakdale, Inverell, Coonabarabran, Bilpin, Wauchope, and elsewhere.

YANCO CHEMIST'S RESEARCH LABORATORY

Rice Research.—Marked progress has been made with regard to rice investigations at this Yanco laboratory.

The Rice Chemist arrived from England, and took up duty in January, 1959. Some important projects have been commenced.

Rice Suncracking Problem.—A protein survey of rice crops in the M.I.A. over the past few years has yielded some interesting data. The survey was initiated to ascertain whether suncracking was directly related to nitrogen content of the grain.

Results to hand from the 1957-58 district survey indicate that mean protein figures for each farm remained constant over the period of the survey. Therefore, development of suncracking does not appear to be related to grain protein—apart from the relationship imposed by decreasing moisture content.

Further work is being carried out to relate the phosphate and potash content of the grain and plant to the nitrogen figures, since nitrogen alone appears to have little effect on suncracking.

Iodine Blue Test of Rice Cooking Quality.—Work on techniques associated with this test has been completed. Investigations are now in progress, studying a number of rice varieties; for cooking quality determination by the iodine test. Aim of the test is to provide a speedy, reasonably accurate, and convenient means to predict the cooking quality of rice varieties. All but one of the varieties examined were of satisfactory cooking quality.

The question of comparative "stickiness" of rice varieties is being investigated, along with the application of the Iodine Blue Test.

Rice Parboiling Process.—Preliminary investigations have been carried out on the laboratory aspects of the parboiling process. This is stated to produce, from a given amount of paddy, more rice with less milling breakage. In addition, the keeping qualities of rice are improved, and a greater proportion of the rice nutrients is retained during the milling processes.

Staff.—A junior assistant was recently appointed to assist the Rice Chemist, in routine work. Output has increased as a result. The Rice Chemist also now has more opportunity to study more specialised and advanced aspects of rice projects.

Equipment.—Research work for the greater part of this year has been seriously handicapped by limited power supply to the Yanco laboratory. The Kjeldahl Unit, for determination of protein and nitrogen in grain plants and soils, has accordingly functioned at slightly less than half its maximum capacity. The greater part of the basic equipment for rice research has now been received. Extension of investigations into a number of specialised fields will necessitate some extra items.

Fruit Quality Research.—Fruit quality investigations at the Yanco laboratory have been discontinued because the Fruit Quality Chemist is overseas under the terms of a Thomas Lawrence Pawlett Scholarship. There has also been difficulty in securing and retaining a suitably qualified and trained junior assistant. A recent appointment may stabilise that situation.

MISCELLANEOUS ANALYSES

Testing of Materials for Rydalmere.—Considerable time has been spent on testing building materials for use in the new Division of Science Services laboratory at Rydalmere, now being erected.

Resistance of materials to the action of strong acids and solvents has been investigated. Materials tested included (i) compressed asbestos cement as a base material for fume cupboards, (ii) wood coated with epoxy-resin for bench tops, (iii) Formica for bench tops, (iv) Vinyl floor-covering material.

Attention has been paid also to the construction of fume cupboards. Laboratories have been visited and various plans studied, to find the most suitable type for Rydalmere.

Soya Beans.—Twenty samples of Soya beans were analysed for oil and moisture content, on behalf of the C.S.I.R.O. Brisbane.

DAIRY TECHNOLOGY SCHOOL

A six days School was conducted at Lismore in August, 1958, in association with officers of Division of Dairying and the Biological Branch, Division of Science Services. It was on behalf of the Department of Technical Education, for trainees for the dairy products processing industry. The curriculum comprised lectures on chemistry and its application to the dairy industry, dairy technology and dairy biology.

CONFERENCES AND COMMITTEES

The Chief Chemist and/or appropriate officers acted in the following committees:—Coastal Pasture Research Committee, Soil Survey Advisory Committee, Plant Nutrition Committee, Pest Destroyers Act Committee, Civil Defence Food and Agriculture Research Committee, Wagga Agricultural Research Institute Advisory Committee, Veterinary Medicines Act Committee, and the Standing Advisory Committee on Wheat.

Botanist Branch

ROYAL BOTANIC GARDENS, NATIONAL HERBARIUM, AND ALLIED ACTIVITIES

Royal Prefix for the Botanic Gardens, Sydney

An outstanding event was the re-designation of our Gardens by Royal authority as the Royal Botanic Gardens, Sydney; in recognition of their age, their continuous association with the development of New South Wales, and their high level of scientific achievement.

Some 570 official Botanic Gardens are listed throughout the world, and many of these are of great age, particularly in Europe, but the Royal Botanic Gardens, Sydney, are older than 80 per cent. of them. In the southern hemisphere only the Botanic Garden at Rio de Janeiro is older than those of Sydney.

Our Gardens have been associated with the development of Australia from the first days of white settlement. They have the unique distinction that within their area began the agriculture and horticulture of a continent. For no other area in any continent can such a claim be made.

The scientific background to the Gardens is provided mainly by the National Herbarium. This includes over 700,000 specimens; many of them of great scientific and historical value. Research by the staff over the past sixty-three years has gained an international scientific status for the Gardens.

Construction of Expressway

The Trustees were faced with a decision by the Government to construct an Express Highway through the Royal Botanic Gardens and Domain. The decision was necessitated by acute traffic problems and the absence of any other practical alternative route.

Construction of the Expressway commenced in December, 1958, and is now well under way. It has considerably inconvenienced the general public visiting the Gardens and resulted in decreased attendances.

For a clear concept of the constructional work and its effect on the Royal Botanic Gardens and Domain the Express Highway can be divided into four sections:—

- (1) The section, from the Conservatorium to Shakespeare Place, which passes through portion of the Royal Botanic Gardens and Inner Domain.
- (2) The section, from Shakespeare Place to Art Gallery Road, which runs on either side of the existing rows of Figs in Fig Tree Avenue.

- (3) The section from Art Gallery Road to Lincoln Crescent.
- (4) The temporary road built through the Sydney Domain to enable constructional work on sections 2 and 3 to proceed.

The Section from the Conservatorium to Shakespeare Place.—This involves cutting a roadway approximately 70 ft. wide, to be covered with a roof and at least 2 ft. 6 in. of soil. It has required the removal of approximately eleven palms, several trees, a number of shrubs, and the entrance gates situated opposite the Public Library. Some of the more valuable trees and shrubs are being moved to other positions. Most have been cut down.

When the area is restored there will be no loss of ground to the Royal Botanic Gardens and the whole area will be redesigned. There could be a distinct improvement in the appearance of this section, and construction of the Express Highway will have resulted in no significant losses. Preliminary designs for the new Entrance Gates, to be in Macquarie Street, are most attractive.

The Section from Shakespeare Place to Art Gallery Road.—Construction of this section will cost some ground, from the Domain and the Botanic Gardens. It will include, approximately, a strip of land through the Royal Botanic Gardens varying from about 12 ft. at the eastern end to about 180 ft. at the western end. On the Domain side of the Fig trees a strip of land varying from 60 ft. wide at the western end to about 110 ft. at the eastern end will also be lost.

In addition, about half the trees in Fig Tree Avenue will be removed as will twenty-four palms and twelve trees on the Botanic Gardens side. New plantings will be required in this area to remedy the position.

The most serious aspect of this section of construction is the destruction of the magnificent and in many ways unique avenue of Fig trees. The untouched portion of the avenue will, even so, retain considerable value, especially if supplemented by further planting.

The adjoining area of the Domain will be redesigned to provide the necessary playing fields. These will not be materially reduced in value by the construction of the Express Highway.

There will be no interference with areas made available for public speaking and for assemblies of national importance. Suitable areas have been provided during the constructional period.

The Section from Art Gallery Road to Lincoln Crescent.—This will result in the loss of about twenty-seven trees, mainly Figs, and the area will have a very bare appearance. Subsequently it could be improved by new plantings. This section will require very careful treatment.

It will also result in the removal of the existing Kiosk. A new Kiosk will be erected on a site which has been selected.

The Temporary Road Through Domain, to Enable Constructional Work on Sections 2 and 3.—The temporary roadway will reduce the time for construction of the Express Highway and the overall costs.

It interferes with the provision of suitable playing areas, but one or two basketball fields and the two main football areas have been re-allocated.

Relative to the Future of Affected Areas.—Close relations are being maintained between the City Engineer, responsible for the constructional work, and the administrative staff of the Royal Botanic Gardens, to minimise damage. Frequent conferences are held, and additional work is placing a heavy burden on staff. The present stage of the construction is causing unsightliness and inconvenience but the restored areas will be so designed as to add to the beauty of the Gardens.

A sum of £15,000 has been allocated for the redesigning of affected areas, and Mr. P. Spooner, Senior Lecturer in Architecture at the University of New South Wales, has been engaged to assist in an advisory capacity on landscaping.

ROYAL BOTANIC GARDENS

Staff Re-organisation.—A recommendation was made to the Public Service Board regarding staff re-organisation, and a new establishment was adopted. It provides for closer supervision of the work of officers, and increased responsibility for each man in charge of a section. The improvement in general maintenance of the Gardens has been striking, and subject of much favourable comment.

Staff appointments included those of Mr. W. Watson as Assistant Superintendent and Mr. M. Watson as Landscape Gardener.

Improvements—The flower-bed lawn immediately to the west of the National Herbarium building has been developed, by enlarging certain beds and the use of selected annuals and the planting of three specimens of *Eucalyptus grandis* ("Flowered Gum"). The latter are towards one corner and diagonally opposite a curving arrangement of five specimens of *Caesalpinia ferrea* ("Leopard Tree"), a native of Brazil characterised by the remarkable grey and marble mottling of the bark.

About 100 shrub and tree species were planted out in lawns and beds during the year. Most of them were not previously represented in these Gardens. These include four species of *Eucalyptus*. One of them, *E. remota*, is a rare native species native to Kangaroo Island, South Australia. Another rare native species planted was *Allocasuarina luskii*, the only Australian representative of the genus *Rhododendron*. It occurs naturally only on a restricted area of Mt. Bellenden Ker in Northern Queensland.

The pathway bordering the western front of the National Herbarium has been re-aligned and widened, with new coping set in place. The verge has been widened between this path and the building, and one bed of *Aster* spp. at the side of the building completely re-arranged to conform with the design of the structure.

Stone coping has been set along the borders of a number of beds in the Middle Gardens, and similar work has been completed on the Pioneer Women's (Sunken) Garden.

The nursery has been completely re-organised and well-defined beds have been arranged throughout the area.

Some *Chenopodium* plants have been planted along the side of the glasshouse to submit the espalier method for such species.

Supply and Exchange of Plants—Potted tree and shrub species were forwarded on request or in exchange to the following places: to Naples, Italy (*Sonchus* seedlings); to Kyoto, Japan (*Macrozamia* seedlings); to Department of Agriculture buildings, Wagga (20); to Wagga College and Experiment Farm (9); to Leeton Experiment Farm (9); to Randwick Boys' High School (24); to Balgowlah Heights High School (15); to Holdsworth Military Camp (15). *Ranunculus* of Queensland Blue Couch Grass (*Lophocoma blundellii*) were sent by air to Bologna, Italy. Selections of indoor plants were exchanged with the City Council nurseries.

Brisbane City Council donated cuttings of *Frangipani* (*Plumeria* spp.), *Euphorbia* spp., and two dozen specially-selected varieties of *Hibiscus rosasinensis*. Adelaide Botanic Gardens sent plants of the rare native succulent, *Ameysonia pulchra*. Sir Harry Monnam gave a selection of glasshouse plants, ferns were received from the City Council, and numbers of individual plants, received from members of the public, included a selection of twelve *Bromeliads* from Mr. Morris of Nelson's Bay.

Landscape Gardening Service—The position of Landscape Gardener was vacant from March to November, 1954. Since November the following work has been completed. For country districts, plans and reports were provided for planting the grounds at Castledare High School, near Newcastle, and for street, park and school plantings at Goulburn. In the metropolitan area, plans and reports were supplied for the grounds of Normanhurst Boys' High School and Narrabeen Boys' High School.

Visits were made to the Sydney Teachers' College, the Watson's Bay Naval Depot, and La Perouse Aboriginal Welfare Board's Establishment, to advise on planting schemes and other relevant matters.

Redesign within the Gardens has included planting of the area at the new entrance to Government House, re-arrangement of enclosures on the walk adjacent to the Herbarium building, re-designing of the sea-wall bed in the Lower Gardens, re-designing of Middle Garden verge, transplanting of several large trees and shrubs from the Palace Garden to other positions, and re-designing of Begonia beds in the Middle Garden.

Organised Visits—Several inspections of the layout of plants in the Royal Botanic Gardens and the glasshouse displays were provided for school groups, horticultural societies, and overseas visitors, under the guidance of staff members.

Daily Telegraph Supplement—Publicity was given to activities at the Royal Botanic Gardens in a four-page supplement in the Sydney "Daily Telegraph." This included an article by the Minister for Agriculture, articles on features of the grounds and exhibits, and photographs.

Glasshouse Displays—The glasshouse staff maintained a fine floral display featuring "Gloxinias" (*Sinningia* spp.), orchids of many species and selections, and many foliage plants such as "Crotons" (*Codiaeum* spp.), *Begonia* and *Philodendron*.

Displays Lensed, etc.—Plant and floral decorations were provided and set-up for parliamentary functions, also in government departments and at the R.A.S. Committee rooms and Departmental exhibits at the Royal Easter Show.

A number of marble and bronze sculptures were presented by the trustees of the National Art Gallery. These will be erected on selected sites in our grounds.

The spraying programme to combat pests and diseases and for weed control has been continuous throughout the year but the effects were impaired during the summer months owing to the high rainfall, and proportion of wet days. Infestation of Azaleas with Lacebug remains a big problem, while white and pink wax scales are everpresent pests on the greater number of species in the grounds. *Armillaria* root-rot was evident on a number of species.

THE DOMAINS

The Outer Domain playing areas have been re-arranged, arising from the work and roadways associated with construction of the Cahill Expressway.

Areas adjacent to the Registrar-General's office and City Railway construction have been restored, and under our direction the corner area at the end of the underground parking station has been regraded and topped-off with good soil by the City Council.

Christmas car parking by city shoppers was permitted in a defined area.

On request from the Trustees the Police Department has restricted car parking to one side of Mrs. Macquarie's Road. Parking on both sides had caused a serious hazard to vehicles and pedestrians.

Throughout the year, various organisations used the Outer Domain as an assembly point for processions and ceremonies.

ADMIRALTY HOUSE AND KIRRIBILLI HOUSE

The position of Special Class Gardener at Admiralty House has been raised to that of Foreman.

Re-designing and planting of Kirribilli House grounds were completed by our staff, but later in the year arrangements were made to withdraw our staff from attending to this area.

CENTENNIAL PARK

This area was satisfactorily maintained, and the usual facilities were provided for sporting activities.

Areas of the park were inspected in connection with a proposal to hold an International Scout Jamboree in Sydney.

Several prosecutions and convictions occurred, in respect of motorists using grassed areas for washing, oil-changing and greasing their vehicles.

NATIONAL HERBARIUM

Plant Species New to New South Wales—The following species were recorded for the first time in New South Wales, from the localities listed. The country of origin or previously-known distribution is given in brackets:—

Acrocalymma brevicaule, on sand dunes between Palm Beach and Barrenjoey; also received from Stockton in 1954, but not previously determined (South Africa).

Acrocalymma laterale, Tweed-Richmond River region (Queensland).

Callitris nuytensis, "Cypress Pine", Dorrigo district (Tasmania).

Kerandersonia corollacea var. *denticulata*, at the Colo River (Brisbane area).

Leersia oryzoides, "Rice Cut Grass", from Leeton (Europe, North Africa, temperate Asia and America).

Prasocarpium dispersans, a diminutive "Leek Orchid", from Kiama area (Tasmania and Victoria).

Scolymus hispanicus, "Golden Thistle", from Mudgee region (Mediterranean Region, naturalised for many years in Victoria).

Veronica hederifolia, "Ivy-leaf Speedwell", from Bathurst area (Europe, Asia, North Africa; widely naturalised in temperate regions; also in Tasmania for many years).

Records of Rare Species.—The following rarely collected species were identified throughout the year:—

Burnettia cuneata, from Barren Grounds Reserve above Jambaroo; only our fourth collection of this small ground orchid species. A fine colour transparency of this flower was obtained at the same time.

Cryptocarya spp., an undescribed species was found at Point Lookout near Ebor; a similar specimen was collected from Dorriggo.

Grevillea shiressii, from Mullet Creek, near Wondabyne; the first collection of this species since the original discovery in the same area some thirty years ago. It has no close relatives in New South Wales. Only one plant was found.

Peristeranthus hillii, from Coff's Harbour district; a fine flowering and fruiting specimen, only the third in our collection.

Pimelea treyvaudii, from Broken Cart Creek, 12 miles south-west of Brindabella; recorded only once previously, from the Orange district.

Pterostylis barbata, a "Greenhood" ground orchid, from the Abercrombie district; the third recorded collection in this State.

Prasophyllum uroglossum, a small-flowered "Leek Orchid", from the Kiama region; only the second recording for this species.

Psilurus incurvus, from the Cookardinia district; second record of this Mediterranean annual grass.

Schoenus nitens, at Lake Bathurst; second record.

Two other species of rarely collected plants were added to the Herbarium collection during the year; namely, *Swainsona unifoliolata* from Angas Downs, Northern Territory, and a filmy fern, *Rosenstockia rolandi-principis*, from New Caledonia.

Extensions of Range.—Field observations and identifications of specimens submitted to the Herbarium show the following to have been recorded beyond their previously known range:—

Eugenia francisii, between Beechwood and Bellangry in the Hastings River area; not previously known south of the Richmond River district.

Jasminum singliflorum, on the Bellingen-Dorriggo Road; a southward extension from the Richmond River.

Juncus acutus, Hillgrove, east of Armidale and the Singleton district; previously not known north of the Hawkesbury River.

Microtis oblonga, from Carey's Peak, Barrington Tops; a higher elevation than previously recorded.

Phebalium dentatum, on Gibraltar Range, 35 miles east of Glen Innes; a northern extension from the Hawkesbury River.

Schoenus turbinatus, on the Gibraltar Range; previously only recorded from the Hawkesbury and Blue Mountains.

Naturalised Plants.—The following species have become naturalised in certain areas:—

Acer negundo, "Box Elder", a tree native to North America; has established a stand on the bank of the Nepean River, south of Penrith. The species readily sets viable fruits in this country.

Anoda cristata, an annual weed native to Mexico and Central America; was first recorded in the Ipswich area of Queensland in 1938, but has spread to Kyogle, Paterson, Inverell, Warialda and Parkes. It is not known to possess any harmful properties.

Juncus acutus. This European "Rush" (it may also be native to this country) forms spiny tussocks and could be a serious weed in moist pasture land. It occurs in Victoria, southern parts of New South Wales, and Armidale and Singleton districts.

Thlaspi arvense, "Penny Cress", a native of Europe and Asia; has become naturalised at Guyra, Glen Innes and Oxford Falls, near Sydney.

Exchanges and Loans with Other Institutions.—Some 2,392 sheets of herbarium specimens were forwarded to twenty-two overseas institutions and three Australian herbaria. Among these were specialised collections of *Eucalyptus*, *Casuarina*, *Chenopodiaceae*, *Cyperaceae* and *pteridophytes*, of particular interest and reference study to other botanists.

In exchange, 2,262 sheets were received from fourteen overseas and three Australian institutions. This material included collections of Japanese pteridophytes; *Acacia* plants of the Aleutian Islands, Persia, Hawaii and Fiji; and some from tropical and central Australia.

Specimens were received on loan from the British Museum and the Botanic Gardens Herbarium, Bogor, Indonesia.

Sheets of Red Algae were loaned to Dr. Norris, University of Minnesota, and of *Zornia* spp. to Southern Illinois University. Sheets of certain species of *Bassia*, *Plectranthus*, *Melaleuca*, *Eucalyptus* and *Ranunculus* were loaned to Australian institutions in several States.

Field Collections and Seed Exchange.—The Seed-and-Plant Collector travelled 5,262 miles in a total of sixty-two days, and completed five major collecting trips, ranging from four days to three weeks' duration, in the following areas:— nearer South Coast; Abercrombie Caves-Trunk Creek; Glen Davis; Bilpin-Mt. Tomah, and Southern Riverina. In addition, twenty-five days or part-days were occupied in collecting on the Hawkesbury sandstone and other formations of the metropolitan area and the Blue Mountains.

In excess of 400 numbers of bulk herbarium material were collected, and more than 100 collections of seed were gathered in quantity for exchange purposes.

Collecting is being confined rather to rare species and those required for specific study at our own Herbarium or at overseas institutions. Some outstanding collections have been made by this officer, by detailed study of the required plants and the specialised habitats in which they are likely to occur. Among species which we are particularly fortunate in so obtaining are *Pterostylis barbata*, *Pimelea treyvaudii*, *Blandfordia cunninghamii*, *Atkinsonia ligustrina*, *Acrophyllum venosum*, and *Fieldia australis*.

In response to overseas requests, forty-nine seed samples were forwarded to seven institutions—in Asia, Europe, America and South Africa; and fourteen samples to Australian Botanic Gardens. Many overseas requests have been for species difficult to obtain. Satisfaction of these will have to await favourable collecting.

In exchange, 139 seed samples were received, from 17 overseas institutions, and eleven samples from two Australian sources. In continuation of the exchange policy, requests have been sent to 65 institutions in 26 countries for some 350 selected species.

The Seed-and-Plant Collector also gathered material of *Utricularia* bladders for study by Dr. Taylor at the Royal Botanic Gardens, Kew, England; *Hibbertia* flowers for Professor Wilson, New Hampshire, U.S.A.; and pre-flowering material of *Atkinsonia ligustrina* for study at New Delhi.

Field Investigations by Botanists.—Investigational field trips were made by members of the botanical staff during the year.

Dr. Joyce Vickery continued her detailed studies of "Snow Grass" (*Poa*) on visits to the south coast, and Crackenbach and Geehi areas of the Snowy Mountains, and the Victorian Alps. She also visited the Snowy Mountains Authority's nursery plots at Cooma for "Snow Grass" observations, and visited the Kiama, Cambewarra and Kangaroo Valley areas for investigation of Rye Grass (*Lolium perenne*) strains in conjunction with the Division of Plant Industry.

Mr. L. Johnson continued his field observations on *Eucalyptus*, *Juncus*, and a number of families, on a trip to the Riverina as far west as the South Australian border, and on a trip with Professor L. Pryor, of the Canberra University College, to the north coast and southern Queensland. Mr. Johnson also made an autumn botanical survey of pasture species near Albury, following a late spring survey by Mr. K. Mair on the same property, in response to a request by the Division of Animal Industry relative to the occurrence of abnormalities in new-born calves.

Chief Botanist, Mr. R. H. Anderson visited Jenolan Caves and advised on the planting and removal of trees, and undertook a similar visit to the Atomic Energy Commission's establishment at Lucas Heights.

Mr. Mair made a number of local trips on field identifications for the Commonwealth Department of the Interior, the Department of Local Government (wildflower licensing section), and the Division of Plant Industry (flour mill sidings and wharves).

Miss Neridah Ford made general and specialised collections in a number of families in the Snowy Mountains and Victoria.

Botanical Research.—The first part of the projected publications "The Flora of New South Wales", submitted for publication in October, 1957, with additional material submitted in June, 1958, is still at the printer's office.

A further part of the "Flora of New South Wales" was completed and submitted for publication in July, 1958. This comprises descriptive matter and analytical keys covering approximately half of the large family Papilionaceae. It contains most of the genera regarded as forming the typically "Australian element" of the family.

Manuscript for a further part of the "Flora" has been almost completed, dealing with several families of the Pteridophyta, and material has been prepared on two further genera of the Papilionaceae—*Templetonia* and *Goodia*. Preparation of manuscript on the family Palmae is progressing.

A paper entitled "The Families of Cycads and the Zamiaceae of Australia" by L. A. S. Johnson, has been read before the Linnean Society of N.S.W. and will be published in the Society's Proceedings. This paper details the research which was necessary prior to preparation of the manuscript on Zamiaceae for the "Flora of New South Wales".

The manuscript on the Pteridophyta of the central coast and tablelands of New South Wales has been completed for inclusion in a handbook of the flora of the Sydney district and Blue Mountains being compiled by a group of botanists at various times members of the staff of the Botany School, University of Sydney. Natural keys have been evolved for the 19 families, 48 genera and 105 species of ferns represented in the area, with descriptive matter of each. A glossary of technical terms and a reference list of synonyms has been provided. When published, this handbook is intended for teaching purposes in the three Universities of this State.

Several groups of the Pteridophyta have been investigated, and rearrangement of the collection has progressed.

A natural key to the Australian genera of the family Polypodiaceae, sensu lato, was constructed, based mainly on microscopic characters of the rhizome, stipe and sori, but retaining the same order of genera as in a scheme of classification based on microscopic characters of the spores, proposed by A. H. G. Alston in 1956. The new key should be much more convenient for practical purposes.

In accordance with the modern classification of the family Polypodiaceae sensu stricto, a number of segregate genera were removed from the old composite genus *Polypodium* which is now treated in a more restricted sense. These segregate genera are *Pleopeltis*, *Microgramma* and *Neocheiropteris*.

The species of *Amphoradenium* were also removed from *Polypodium* sensu lato and placed in the family Gammitidaceae.

The collections of *Polypodium squamatum* and *P. furfuraceum* have been segregated from *Polypodium* sensu lato with a view to determining their relationships to the Australian species of this genus.

The 60 Australian and overseas species of *Microsorium* were sorted into two groups approximating to the genera *Microsorium* and *Phymatodes* as defined by Holttum, Ching and Christensen. It was not found possible to maintain a distinction between these two genera, on any character, as a number of intermediate species occur in Australia and New Guinea. The same conclusion was reached by Copeland in his "Genera Filicum" but is at variance with most authors.

Species of *Thelypteris* and *Cyclosorus* have been removed from *Dryopteris* sensu lato and transferred to their appropriate names under the segregate genera in cases where these had been published. *Thelypteris* and *Cyclosorus* are regarded as members of the *Thelypteridaceae* in recent fern classifications, whereas *Dryopteris* sensu stricto and its allies belong to the *Aspidiaceae*; taxonomic and cytological evidence has proved that these two groups of genera are not so closely related as was formerly thought.

The Australian and overseas specimens of the family Lycopodiaceae have been rearranged according to Herter's classification in *Index Lycopodiorum* (1949); a number of these tassell ferns are grown as epiphytes in glass- and green-houses.

The herbarium collections of the family Hymenophyllaceae were reviewed in the light of recent monographs and the two previously recognised genera were divided into 34 genera.

The specimens of the fern general *Plagiogyra* (Plagiogyraceae) and *Woodwardia* (Blechnaceae) have been resorted, following the acquisition of a large number of Japanese duplicates of these genera.

Research has continued on the *Acacia decurrens* group of wattles. A change of nomenclature of one of the principal tanning bark wattles has been proved necessary, following a study of a Type Specimen borrowed from the Jardin Botanique de l'Etat, Brussels. The collections of *Acacia vomeriformis*, *A. ulicifolia* and *A. brownii* were studied, and several sub-species segregated for each species.

A historical collection of *Acacia* specimens collected in eastern and western Australia by Huegel, A. Cunningham, R. C. Gunn and F. Mueller was identified at the request of the Jardin Botanique de l'Etat, Brussels, Belgium.

Progress has been made on the revision of the genus *Poa*, and field studies of the populations were carried out on the Snowy Mountains and in parts of the Victorian Alps. Structure and development of the vegetative shoots were studied in plants grown in the experimental nursery at Cooma of the Snowy Mountains Hydro-electric Authority.

Research on the genus *Eucalyptus* has continued, and various less well-known species have been studied in the field. Areas visited include the south-western districts of New South Wales, and adjacent parts of Victoria and South Australia, especially along the Murray River, the Adelaide district, and northern New South Wales and adjacent districts in Queensland.

Observations were made on the little-known *Eucalyptus froggattii* and *E. lamprophylla*. An undescribed species of *Eucalyptus* discovered some years ago in the Rylstone-Mt-Coricudgy district of New South Wales was found to be abundant in the Grampians, Victoria, although it has not been recognised by Victorian botanists. It has not been found between these widely-separated areas. During these field trips the opportunity was taken to extend field observations on the genera *Casuarina* and *Juncus* which are also currently under investigations.

A key to all the genera and species of the family Loranthaceae which occur in Australia has been prepared.

Revision of the genus *Lomandra* is in progress.

Lectures.—Lectures were given to twelve scientific groups and horticultural clubs by members of the Herbarium staff.

Determination on Special Collections/Materials.—As well as general identifications a number of special collections were determined, including:—fifty specimens of *Casuarina* spp. cultivated in Southern China; twenty-five *Eucalyptus* spp. grown at Dehra Dun, India; *Lastreopsis* and *Dryopteris* spp. for the Smithsonian Institute, Washington; living exhibits of local and Western Australian wildflowers on display at the Sydney Waratah Spring Festival in the Town Hall; films of central Australian wildflowers, and several exhibits of plant material submitted by the Police Department's Criminal Investigation Branch.

Identification of Plant Remains in Livestock Rumens.—Plant parts from the stomach contents of 52 sheep, cattle, horses and pigs have been determined by the botanical staff, in association with veterinary enquiries.

Service in Various Committees, Trusts, etc.—The Chief Botanist and other members of the botanical staff have served on several committees, including: the Remembrance Driveway Committee; the Technical College Horticultural Advisory Committee; the Standing Committee on Trees and Forests, of The Men of the Land Society; the Muogamarra Trust; the Linnean Society of N.S.W.; and the A.N.Z.A.A.S. sub-committee on Compilation of Australian Flora.

One attended the Adelaide meeting of A.N.Z.A.A.S. and, later, Melbourne meetings of a committee to consider the compilation of an "Australian Flora."

Higher Degree for Miss Vickery.—Miss Joyce W. Vickery has been admitted to the degree of D.Sc. by the University of Sydney in recognition of her studies on the taxonomy of certain native grasses.

Dr. Vickery is attending the 9th International Botanical Congress at Montreal later in the year and will undertake a study of certain grass species at American Herbaria. A consignment of specimens from this Herbarium has been forwarded to await attention by Dr. Vickery when she arrives.

AGRICULTURAL RESEARCH INSTITUTE, WAGGA WAGGA

Wheat Improvement

Field Testing.—Seasonal conditions at Wagga and Temora were again so unfavourable as to prevent adequate assessment of yield and quality characteristics of crossbred material. Warm dry weather during November severely damaged all plots, and yields were greatly reduced. Grain protein figures were unusually high, 15-20 per cent.

Stem frosting ruined the trials at Condobolin but winter wheats and Glenwari and Bencubbin spectacularly demonstrated their tolerance to frost.

Stem rust was the major factor in determining yield differences in the two trials at Quandialla.

Glenwari, Olympic and a new high quality crossbred M.972 yielded well at most centres.

New Variety—Heron.—Following extensive tests the bunt resistant crossbred R.D.R. x 4 Insignia 49 has been registered and released as a new variety under the name Heron. This early maturing variety is also resistant to several races of stem rust and has some tolerance to *Septoria tritici*.

Breeding for Quality.—The programme of back crossing for quality has continued, and progress has been made in developing additional tests for the quality evaluation of single plant selections.

Study of Wheat Plant Developmental Physiology.—Developmental physiology of the wheat plant is under special study, with a view to producing varieties better adapted to the environment of the southern wheat belt. The rate of leaf production and the reproductive development of the wheat plant have been shown to depend on environmental factors such as temperature and day length, ultimately finding expression in terms of the time taken to heading and flowering.

Wheat Disease Studies

Survival of Cereal Root Rot Fungi.—Previously reported laboratory studies on the survival of cereal root rot fungi in wheat straw buried in soils of high and low fertility showed that whereas survival of *Ophiobolus graminis* and *Fusarium culmorum* were promoted under conditions of high soil fertility, that of *Helminthosporium sativum* was markedly depressed, while *Curvularia ramosa* persisted equally well in both test soils.

Survival of these four fungi under field conditions is now being investigated at different soil fertility levels. Preliminary results are in general agreement with those obtained in the controlled laboratory studies, although somewhat lower survival percentages are being recorded for all test fungi.

Colonization of Cereal and Grass Straw by Cereal Root Rot Fungi.—Studies have been completed on the ability of *O. graminis*, *F. culmorum*, *H. sativum* and *C. ramosa* to colonize saprophytically the straw of cereals (wheat, oats and barley) and grasses (*Phalaris tuberosa*, *Hordeum leporinum* and *Lolium rigidum*) buried in unsterilized soil. Both *F. culmorum* and *C. ramosa* proved to be vigorous saprophytic colonizers of all test substrates, but only token colonization was recorded for *O. graminis* and *H. sativum*.

Cereal Virus Diseases.—Aphid transmission tests, using oats as indicator plants, confirmed the local occurrence of the virus disease cereal yellow dwarf on wheat. Previously it had been reported on wheat and oats from northern N.S.W.

Collaborative work with the C.S.I.R.O. is in progress, designed to check on the suspected occurrence of cereal virus diseases other than yellow dwarf.

Wheat Quality Investigations

Milling and Baking Tests of Breeders' Material.—The routine milling and baking unit is now functioning as originally envisaged, and the installation of a Buhler experimental mill has made it possible to test all wheat breeders' material during the four-month interval between harvest and the following seeding.

High protein levels in grain from most 1958 trials made it difficult to assess inherent differences in baking quality. As a result, more material than usual has had to be carried on for an additional year's test.

Starch Damage and Flour Quality.—Previous studies have shown that flours from wheats highly susceptible to starch damage during milling were almost invariably high in phos-

phorous and ash. It has now been shown that this is due to the contamination of the flour with bran dust. Varietal differences in susceptibility to starch damage are associated with metabolic differences during the maturation of the grain. These studies are being continued.

Analytical Techniques.—It has been shown that variable results from the Kjeldahl nitrogen technique can be attributed to differences in the degree of fineness of the material studied. Finely ground material may give figures up to 15 per cent. above that for coarser material.

The Biuret reaction has been adapted for the rapid determination of protein in wheat and flour samples. Small differences between Kjeldahl and Biuret figures were shown to be due to the presence of non-protein nitrogen which would not react with the Biuret reagent.

Oat Improvement

Grazing Trials.—Adverse seasonal conditions reduced yields and bushel weights in the main trials at Temora Experiment Farm. Yates Algerian was again the leading grazing variety and steps have been taken to supply this variety to Registered Seed Growers as a replacement for Algerian.

Steps have been taken in establishing grazing trials at several centres in the southern half of the state, to determine the adaptability of the more promising crossbreds.

Grain Trials.—In the grain trials Avon (early sown) and Orient (late sown) were the best varieties at Temora while W. 4464 yielded well in both trials and also at Condobolin.

Pasture and Weed Investigations

Subterranean Clover.—Field work in 1958 in connection with ultra-violet light tests as an aid in seed certification revealed no morphological differences between Mt. Barker strains exhibiting normal and abnormal fluorescence reactions.

Skeleton Weed.—The effect of reduced competition for nitrogen, brought about by fallow spraying, was found to be masked by the seasonal conditions during the ripening period. Conversely—seasonal effects were minimised at this time by reduced competition for moisture, following a pre-heading spray.

Experiments are in progress to determine the effect of fallow and preheading sprays in successive years, on wheat continually grown on the same area.

Soil Fertility Studies

Phosphate Status in Soils of the Southern Wheat-belt.—Work on methods for determining the phosphate status of soils in the southern wheat-belt has continued. Significant correlations have been obtained between some chemical extraction values and plant response in pots, but no correlation has been found with phosphate response under field conditions. Work during the past year indicates that the two main reasons for poor correlations between laboratory values and crop response are:—

- (1) Variations in phosphate sorption capacity of the soils of the region, and
- (2) limitation of field response to fertilisers by available moisture.

Residual Value of Fertiliser Phosphate.—Laboratory studies on phosphate sorption have provided a method for predicting the residual value of fertiliser phosphate to plants. Field and pot experiments have been commenced, to test this laboratory method against actual plant response values.

Soil Nitrogen.—A study is being made of the seasonal fluctuations in the levels of soil nitrate and ammonia nitrogen under a growing wheat crop. It is hoped to derive a nitrogen demand curve for the crop, and to examine this requirement in the light of the supply of soil nitrogen over the growing period.

Agonomic Survey.—The survey method is being used to secure quantitative data on the fertility build-up under clover ley, and the influence of various periods of cropping and pasture on the yield and quality of subsequent wheat crops.

DIVISION OF MARKETING AND AGRICULTURAL ECONOMICS

State Marketing Bureau

Marketing Boards.—The several Marketing Boards constituted under the provisions of the Marketing of Primary Products Act, 1927-56, continued to function. They comprise the Egg, Rice, Navy Bean, French Bean Seed and Wine Grapes Marketing Boards. Action to wind up the affairs of the Potato Marketing Board (in liquidation) continued; but finality has not been reached.

Two ministerial nominees on the Egg Marketing Board, and one ministerial nominee on the Navy Bean Marketing Board, resigned. Action was taken to appoint new ministerial nominees to fill the vacancies.

Regulations under the Marketing of Primary Products Act, 1927-56, were amended to alter the pooling periods in respect of the French Bean Seed Marketing Board.

Action was also taken to amend regulations concerning payment of sustenance allowances to members of all Marketing Boards.

Polls and Elections.—Under the Marketing of Primary Products Act, 1927-56, two polls were conducted for election of producers' representatives. These were:—

- (a) Triennial Election of five producers' representatives to the Rice Marketing Board;
- (b) Triennial Election of five producers' representatives to the Egg Marketing Board.

Preliminary work was undertaken with a view to the conduct of the triennial elections in respect of the French Bean Seed and Wine Grapes Marketing Boards later in 1959.

Banana Growers' Plebiscite on Sales Systems.—At the request of the Banana Growers' Federation of New South Wales, the Division also conducted a plebiscite of banana growers, on a question relating to the system of selling bananas in the City Municipal Markets. The question placed before growers was that of whether the agent or the merchant system of selling should operate.

Market Reports and Related Services.—The Marketing Section of the Division continued to obtain and publish information relating to the marketing of primary products, as required by the Marketing of Primary Products Act.

Daily reports were prepared for broadcasting by the national network of the Australian Broadcasting Commission and by several commercial radio stations in country districts. The reports cover trading operations at all wholesale markets in the Sydney metropolitan area. They are also published in the Division's *Daily Wholesale Price Quotations*.

The daily reports are widely used by the Sydney metropolitan press, and by several weekly newspapers which circulate mainly to primary producers. Newspapers and broadcasting organisations' interest in the Division's daily price quotations has further increased.

Collection of retail prices on a daily basis had to be discontinued during the year. This reflected staff shortage and changes. This service will be resumed as soon as the staff position is stabilised satisfactorily, and new staff trained for this and other work.

Further work on the analysis of the demand for fresh fruit has been carried out. There is later reference to this under the heading "Economic Research".

The *Weekly Marketing Notes* have continued. This publication includes reports on the cattle, sheep and pig sales at Homebush, together with reports on prices and supplies of fruit, vegetables, meat, poultry, grain, miscellaneous farm produce and processed products. It includes also a report on the overseas' grain position.

Cold storage statistics for eggs, butter, cheese and fruit were collected and published. A series of average monthly prices for a comprehensive range of farm produce was computed from the Divisional records. These were published in the *Weekly Marketing Notes*.

Wholesale and retail stock feed prices were collected on a monthly basis.

Compilation of statistics relating to the arrival of primary products into Sydney by rail and sea, from interstate and intrastate sources, continued.

Statistics of dressed poultry prices were also collected. They are not published, but are available to the public on request.

Numerous inquiries were received from a wide variety of sources, for detailed market information of many farm products. As in the past, these inquiries came from State and Federal Departments, banks, processors, trade agencies and growers' organisations.

Crop Reviews and Forecasts.—Forecasts of production for wheat, oats, broom millet and citrus fruits were prepared and published. However, owing to the staff situation, the forecast of potato production—issued regularly for many years—has been discontinued temporarily.

The basic data for the Division's crop reviews and forecasts were supplied by Departmental district officers and by a corps of honorary crop correspondents.

The monthly publications, the *Review of Grass Conditions* and *Pastoral Outlook* and the *Report on Production Trends* were continued throughout the year.

Meteorological Services.—An officer of the Division continued as Departmental representative in the State Climatological Committee of New South Wales, and as liaison officer between the Department and the Sydney Weather Bureau.

Extensive meteorological records were maintained, and meteorological advice and data were again provided for use by officers of the Department and members of the public in relation to farming pursuits and, in particular, in connection with the Division's Crop Forecasting services.

The Division assisted in liaison between the Department and the CSIRO, in connection with the latter's programme of cloud-seeding and rain-making experiments in the Upper Darling Basin. An assessment of the experiments during 1958 was prepared for the Department.

Economic Research

Loss of Research Economists.—The Division's economic research programme suffered severely, owing to loss of experienced research staff. Four of the Division's more experienced research economists resigned to take up positions, at various Australian universities; a fifth resigned to join the staff of a Commonwealth department. Another senior officer has been on sick leave for much of the year. The acute shortage of trained agricultural economists in Australia has made it impossible to replace all of these officers. Thus, the research programme has been greatly reduced.

The Division continued to receive numerous requests for research on a variety of economic problems. Many of these would involve field surveys. Because of the staff position most of the requests had to be refused.

Main research projects, completed during the year or in progress at the end of it, are as follows:—

Southern Tablelands Regional Research and Assessment Study.—This continued but preparation and publication of reports have been delayed by the staff situation. Only one comprehensive report from the study has been finalised. This dealt with "Fodder Conservation in the Southern Tablelands Wool Industry". It was published in the *Review of Marketing and Agricultural Economics* in 1959. It dealt with the costs of fodder conservation, and the profitability of alternative conservation policies. The main conclusions were that:—

- (i) Even at relatively low (1958-59) wool prices, the conservation of pasture hay as a means of raising the stocking rate of Merino sheep could be expected to give reasonable returns on capital (10-15 per cent.) on well-developed Tableland properties. However, on partly-improved properties, in the majority of cases further pasture improvement would be a more profitable means of raising carrying capacity than is fodder conservation for regular seasonal feeding.
- (ii) Conservation of pasture hay can and probably will unlock a very large potential in the Australian sheep industry. Conservation of only one-fifth of the spring flush of improved pasture in New South Wales sheep areas would permit a theoretical increase by approximately 17,000,000 sheep in the State's carrying capacity.
- (iii) Combination of conservation of pasture hay and silage with the winter grazing of cereal crops would, in many cases, be a cheaper method of closing the feed gap than would be pasture hay alone.
- (iv) Research on management aspects of fodder conservation is grossly inadequate.

A further report on fodder conservation is being prepared. This report will deal with fodder conservation practices in the Yass Valley, together with a detailed presentation of the

results of a farm survey of fodder conservation costs. This survey shows that the main determinants of the unit cost of producing fodder are the yield of conservable material per acre and the scale of operations.

Most Yass Valley graziers owning pick-up balers are producing at relatively high costs, because of the very low degree of utilisation of their balers. The majority produce less than 50 tons of pasture hay per annum. The survey suggests that properties extensively pasture-improved have significantly higher fodder reserves than relatively undeveloped farms; and there are good reasons for believing that the further development of pasture improvement will lead to less production instability in the wool industry.

A further report on economic aspects of pasture improvement in the Yass Valley is in preparation, but, owing to resignation of the officer mainly concerned, completion is likely to be considerably delayed. Arrangements have been made with the University of Melbourne, to which the officer has been appointed, for him to continue the work until the main economic aspects have been completed.

Irrigated Land Use in the Southern Murray Basin.—Research continued into the problems of production instability in south-eastern Australia and the contribution of integration—between irrigated land use and farming in non-irrigated areas—towards meeting this problem. In part, the study has been based on field enquiries in three States. The enquiries have been made by an officer of the Division whilst on study leave at the Australian National University.

Arising from this research, an article entitled "Integration of Irrigation and Dryland Farming in the Southern Murray Basin—Part I: Need for Reappraising the Concept" was published in the *Review of Marketing and Agricultural Economics*. Part 2 of this study is now in preparation, for publication in a forthcoming issue of the "Review".

During the year, the Australian National University provided facilities for an officer of the Division to further this enquiry by a comprehensive mail survey of approximately 1,300 farms in non-irrigated areas of Victoria and New South Wales. The response to this survey was excellent. Results are now being analysed. They will be incorporated in a future publication of the Division.

Farm Management Study—Nowra District.—This study commenced in July, 1958. It has been carried on in conjunction with the Nowra Co-operative Dairy Co. Ltd. A group of eighteen dairymen has kept detailed records of their farm operations and finance. The work will continue in 1959-60, when additional farmers will join the group.

The records for each farm will be analysed each year. Reports will be prepared for each co-operating farmer, for the group as a whole. Thus, farmers will be able to compare their yields, stocking rates, costs, prices and incomes, etc., with the average for similar properties. The study will also yield more general material for use in extension work.

Demand for Bananas and Pineapples in the Sydney Wholesale Market.—A study of the relationship between price and supply of bananas was carried out. Results were published in the *Review of Marketing and Agricultural Economics*. The analysis, for the period from 1948 to 1957, answered a number of questions as follow:—

- (i) There is close correlation between price and supply of bananas in the Sydney Wholesale Market; and some 86 per cent. of price changes in the market were related to changes in supply.
- (ii) Relationship between price and supply did not vary during different seasons.
- (iii) Relationship had been stable in the period 1948 to 1950; in 1951 a transition occurred; and, again, a stable relationship ruled from 1952 to 1957 (later research showed that this continued throughout 1958). The curve representing the period 1952 to 1957 was far more inelastic than the 1948-50 curve. Thus, in response to a given change in supply a much larger price movement occurred during the latter period than previously.

A conclusion from the stability of the relationship from 1952 to 1958 is, that with rising costs of production and the increase in the cost of living in general, the real income of the banana grower has diminished.

A similar analysis to that of the wholesale demand for bananas, is being undertaken for pineapples. Pineapples were chosen for this analysis mainly because of the availability of supply figures. This analysis is not completed; but some differences, between the two types of fruit, can already be

noticed. The demand for pineapples is for instance subject to strong seasonal variation, with distinct winter and summer demand curves.

Another difference is that the demand for pineapples is slightly more elastic than that for bananas. As for bananas, however, no change in the price/supply relationship has occurred since 1952.

Warrell Creek, River Improvement District.—At the request of the Water Conservation and Irrigation Commission, the Division co-operated with the Division of Plant Industry in a survey of properties in the Warrell Creek River Improvement District. This was the third of a series of economic studies made in this district. Its object was to assess the net worth, to farmers, of changes in land use induced by the erection of a barrage on Warrell Creek. A report has been submitted to the Commission.

Classification of Types of Holding in N.S.W.—Collaboration with the Commonwealth Bureau of Census and Statistics continued, on the classification of holdings into types—on a basis of the Agricultural and Pastoral Census. Using results from the 1955-56 Census, officers of the Division have commenced the preparation of a series of maps of the State, to be used in an article in a forthcoming issue of the *Review of Marketing and Agricultural Economics*.

Advisory, Educational and Extension Activities

Policy Advice.—The Division has provided advice when requested, on economic policy affecting agriculture.

The Division also continued to examine and advise on the position concerning import and export coarse grains, protein concentrates and other commodities.

Lectures at Extension Schools, etc.—As in the past, officers of the Division addressed numerous extension schools organised by the Department, the Agricultural Bureau and the universities. Officers also addressed various professional societies and other organisations, on economic aspects of the rural industries.

Lecture Courses at Agricultural Colleges.—This Division has provided a lecturer in Agricultural Economics at Wagga Agricultural College since inception of the College, and this arrangement continued in the past year. The Division also assisted the lecturer in Agricultural Economics at Hawkesbury Agricultural College; and has continued to be responsible for examining in Agricultural Economics at each of these colleges.

Report on Farm Management Advisory Services in England.—Principal Economics Officer Mr. P. C. Druce visited the United Kingdom privately during the year. Arrangements were made for him to study the organisation and administration of farm management advisory services in England and Scotland. Accordingly, Mr. Druce visited the major universities in the United Kingdom to discuss farm management research and advisory services, and also had detailed discussions with the Ministry of Agriculture, Fisheries and Food and officers of the National Agricultural Advisory Service.

He has submitted a comprehensive report on farm management advisory services in England, including reference to the possibilities of implementing a similar service here.

Representation in Committees

The Division of Marketing and Agricultural Economics has been represented in the Advisory Panel of the Hunter Valley Research Foundation and, in particular, has participated in activities of this Foundation's "Land Use" and "Economic Research" Committees.

The Division continued to provide the Executive Officer for the State F.A.O. Committee.

Officers acted as Departmental representatives in the State Mapping Advisory Committee, the State Nutrition Committee and the Markets Advisory Committee.

DIVISION OF INFORMATION SERVICES

Editing Services

Agricultural Gazette of N.S.W.—Circulation of this monthly (96 pp., illus., incl. 42 pages of advertising, four-colour cover) increased from 33,750 to 34,500 copies per month. The Printing Office was at one stage of the year four months behind

month of publication. In March, 1959 many addressees were still awaiting the November, 1958 and later issues. At the close of the twelve months, the Printing Office had yet to deliver the May and June, 1959 issues. The change-over from the old to a new printery accounted for much of the lag.

Poultry Notes.—Circulation was some 5,800 per month, as in the previous year.

Dairy Topics.—Financed by the Dairy Industry Extension Grant this journal was despatched to more than 18,000 addresses, practically all dairy farmers, at two-month intervals.

Booklets, Pamphlets, etc.—One hundred and fifty publications were sent to the Printer after editing attention; and 162 were received from the Printer, including seventy-five from previous years. In 1957-58, 127 had been sent to the Printer, and ninety-nine were received from him.

Press Copy.—Circulation of this weekly increased to near 1,200, from 1,150 in the previous twelve months. Mainly it is for use by newspapers and radio stations of which there are some 400 in the mailing list.

Five hundred and eighty-three (583) items and twelve illustrations were published in the *Press Copy* sheet, including at least one item of women's or farm home interest in twenty-nine of the fifty-two issues.

Stereo Loans to Newspapers and Journals.—One hundred and four (104) loans of stereos were made in this service, based on blocks used in the weekly *Press Copy*.

Roneo-ed Press Releases.—Ninety-one (91) press statements were stencilled, roneo-ed and despatched, involving assembly and enveloping of 24,934 roneo-ed sheets. The total of ninety-one statements contrasts with 183 in 1956-57 and 143 in 1957-58. Most of such releases are copy from the Ministerial office.

Farmer Handbook Volumes.—The Division is producing two volumes, "Weeds" and "Pastures", in a Farmer Handbook series. This is an Agricultural Extension Grant Project. Each volume will be a text book in its own right.

The "Weeds" volume has been printed, and 5,000 copies of the first edition are reported as ready to be bound. At this date the Government Printer is unable to state the date of availability nor the price of the book. The 360-page book includes eighty-two colour plates and 154 black and white illustrations.

Work on the "Pastures" volume has progressed well into Chapter IX of the projected eleven chapters. During the year further work on most of the preceding chapters has been needed, as has a good deal of research towards correct nomenclature (revised by botanists) of 260 species of grasses and other herbage.

Colour-plate Insect Pest Pamphlets.—Eight of the projected fifty in a series of one-sheet, colour-plate leaflets were received from the Printer in June, 1959. They are most attractive. On free-issue, stocks would undoubtedly be quickly exhausted, especially by school-children for use in "projects".

Only 3,000 copies of each have so far been printed and distribution has been confined to Departmental offices for awareness. Thought is being given to wider distribution on a sale basis.

Advertising Revenue.—Revenue from sale of advertising space in publications declined, from £12,347 in 1957-58, to £10,909 in 1958-59. Mainly the revenue is from space in the monthly *Agricultural Gazette of N.S.W.*

Factors thought to be responsible for the decline in advertising revenue have been examined, and been subject of report through other channels. They are of temporary nature. Revenue is likely to return to normal in the ensuing year.

Enquiry Section and Publications' Distribution

Enquiries.—Excluding enquiries handled by the Home Gardens Enquiry Officer (7,452, see later paragraph) this Section handled with the aid of the literature available for distribution some 84,687 requests for information, compared with 78,314 in 1957-58 and 87,687 in 1956-57.

Distribution of the 84,487 requests—per phone, per letter, or at-the-counter, is of interest:—

Enquiries	1956-57	1957-58	1958-59
Telephoned	19,064	11,288	16,757
Postal	21,222	20,145	18,748
At the Counter	47,401	46,881	48,982
Totals	87,687	78,314	84,487

No record of at-the-counter requests handled in the Agricultural Pavilion during the 10 days and 8 nights of the R.A.S. Show was kept; but the total there would also run into many thousands. The requests there kept 4-6 officers under constant pressure each day and 1-2 officers busy each night.

Publications' Distribution.—1,067,525 items of literature were distributed, compared to 891,301 in 1956-57 and 893,460 in 1957-58.

Some 281,540 items were consigned to Regional and District offices for local distribution. These are in the overall total of 1,067,525 items.

Sale Publications.—Three thousand three hundred and thirty-one (3,331) publications were sold from the Department's office, for a return of £539; compared to 2,270 items, for a return of £638, in 1957-58. Had the Farm Record Books "Sheep & Wheat", "Dairying", and "Horticulture" been in print the total of items sold could have been a lot higher. The "Sheep & Wheat" Records Book came back into print just prior to the close of the 12 months.

Home Garden Enquiry Officer's Service.—The H.G.E.O. kept a separate record, as a measure of the volume of enquiries which—in his absence—would be referred to subject-matter officers in other Divisions, with consequent interruption of their attention to commercial farm problems. He handled 7,452 requests.

Development of this service from 1955-56, has been tabulated:—

Enquiries handled by the H.G.E.O.	1955-56	1956-57	1957-58	1958-59
Telephoned	1,050	2,700	4,430	4,501
Postal	950	900	820	818
At the Counter ..	2,000	4,000	3,750	2,133*
Totals	4,000	7,600	9,000	7,452*

* The position was vacant for almost 2 months of this year.

Library Services

Staff and Allied Matters.—Central librarian, Mr. E. H. Wilkinson returned from overseas in November, 1958. He had spent a year mainly in the Graduate Library School, University of Chicago, including work towards a higher degree; and partly in intra-continental travel, amongst North American libraries. His report has been completed.

Several staff changes have occurred; but the establishment is again at full strength: eight officers with library training, apart from office assistants.

In cataloguing the National Herbarium branch library, assistance formerly provided one day a week by the Public Library of N.S.W. has been discontinued.

The library of the Department of Soil Conservation Service is attended part-time by one of our library assistants. Re-allocation of these duties to the Department of Conservation establishment will yield that assistant's time for attention to the arrears of cataloguing in National Herbarium branch library.

Preliminary arrangements are in hand for transfer of the Biological Branch, Entomological Branch and Chemist Branch collections to the Rydalmere site. A total of 3½ officer-days per week is spent by library staff in those branch libraries. This will be inadequate as plans for the transfer progress.

Full-time librarianship has been maintained at Hawkesbury Agricultural College, and for the Animal Industry Division/Glenfield Veterinary Research Station branch libraries.

There has been no development in respect of providing a librarian for Wagga Agricultural College and the Agricultural Research Institute, Wagga.

Library Accessions.—14,383 items (books, periodicals, bulletins, reports, etc.) were accessioned, from many parts of the world; compared with 14,658 in 1957-58 and 11,951 in 1956-57.

Books accessioned	310
Periodicals accessioned	10,756
Bulletins, Reports, etc., accessioned	3,317
Total accessioned	14,383

Of the 310 new books, 83 were acquired with Commonwealth Agricultural Extension Services Grant funds—for location in country offices. There are select collections in 52 country offices; comprising 1,317 books.

Agricultural Colleges' Book Purchases.—In addition to aforementioned book purchases, 86 books for Wagga and 143 for Hawkesbury Agricultural College libraries have been acquired this year from special trust accounts; funds derived from the "Students' Library Fee" system introduced at each college two years ago.

Central library staff have done the requisitioning, and in the case of Wagga College—since there is no formal librarian there—have also catalogued the books and supplied the cards.

Central Library Loans.—28,754 items were loaned, compared with 28,572 in 1957-58 and 26,266 in 1956-57:—

Periodicals circulated . . . 24,696 (av. 475 per week)
Miscellaneous loans . . . 4,058 (av. 69 per week)

Periodical "Select List of Publications Received".—This compilation has been sent to all appropriate officers/offices—country and head office. Three issues of the list were compiled and distributed; as against a normal of six. Each comprises about twenty foolscap pages of classified references. Issue of three in lieu of the normal six reflected the staff position.

Photo-copying Service.—692 photo-copying jobs were completed; as against 374 in 1957-58. They involved 4,197 sheets; as against 3,600 sheets in 1952-58. The average number of sheets per job (6.1) declined by comparison with 1957-58 (9.5). Attempts have been made to secure reprints of longer articles, whenever time has not been a critical factor.

Reference Work and Searches.—Reference work and searches on behalf of head office and country staff, external organisations, the public, the Press, continued to be important components of the library service.

A project of interest in this section of the library services this year included the compilation of Department of Agriculture library entries for the C.S.I.R.O. Sheep Biology Laboratory's publication—"An Australian Bibliography on Original Research on Sheep and Wool Production: with special reference to the Merino, 1946-57, Part I." Entries were also submitted for a supplement on sheep and wool extension work.

Inter-Library Loans.—Co-operation with libraries of other organisations, Commonwealth, State, Universities, and commercial, continued. The Department lends more than it borrows in this inter-library co-operation, but the work is one of the most useful means of contributing to spread of agricultural information.

Display Art/Designing Services

Show Exhibits and Other Displays.—The Department's display and information bureau, supported by a film theatre, at the 1959 R.A.S. Show, was again a major undertaking. This year a Fruit Fly bay and a Weeds bay were featured.

The information bureau and theatre were serviced throughout the ten days and eight nights of the Royal Show, usually by six officers for day sessions and two officers for night sessions. Other divisions co-operated, providing some 50 per cent. of the rostered personnel.

Country officers' show efforts at Grafton, Maclean, Taree, Maitland, Newcastle, Nowra, Bega, Tenterfield, Glen Innes, Inverell, Goulburn, Young, Wagga, Moree, Narrabri, Gunnedah, Orange, Bathurst, Leeton, and Berrigan, and some others, were assisted in varying ways.

The assistance included help in planning, requisitioning, ticket- and sign-writing, artwork and, in a few cases, manual construction; also the loan of automatic slide-projectors, transparency light-boxes, transparencies, artificial grass-matting, etc.

Aids/Charts, etc., for Lectures and Demonstrations.—The demand from subject-matter officers, head office and country, continued to expand. Only some of the demand could be met.

Assistance to Editing Section.—The artist fulfilled considerable assistance comprising layout; finished artwork in line, line and half-tone, half-tone and colour; booklet covers, maps, graphs, and photograph retouchings for blocks.

Photographic Aids Services, Cine and Still

Subject-matter Officers' 35 mm. Photography.—There are now over 100 x 35 mm. cameras amongst country offices; in addition to a head office camera pool (eight) maintained in this Division.

The photographic outcome is channelled through this Division, en route to and from processors. Tutorial comment has been forwarded by the Photographic Aids section to the individual officers with the return of 35 mm. transparencies.

The outcome was 6,960 colour and 6,510 black and white 35-mm. slides, compared to 5,420 and 5,330, respectively, in 1957-58.

Tutorial Letters.—Four hundred and ninety letters of tutorial advice on photographic technique were sent to country offices, compared to 459 in 1957-58. Officers' interest in advanced and specialised photography continued to increase. Their inquiries included photomicrography and interior photography. Photocopies of technical information, from journals, on photomicrography, etc., were made and dispatched in appropriate instances.

Tutorial Sessions, Including Country Visits.—The Photographic Aids Officer provided sessions on "field photography in extension service" at the Extension Service/Methods School for Departmental officers, two Extension Service/Methods Schools for Veterinary Inspectors, and at similar schools for University of Sydney and University of New England undergraduates in agriculture or rural science.

He also visited country offices in Northern Region and Western Region, and Hawkesbury Agricultural College, to advise officers on photographic matters.

Advice on Acquisition of Photographic Equipment.—Officers of this and other Departments continued to call on the Photographic Aids Section for advice prior to acquiring photographic equipment.

In this Department an appreciable amount of photographic equipment has now been acquired privately by officers—and is used in their official duties, largely an effect of interest and skills encouraged by the Photographic Aids Section.

Prints to Illustrate Reports and Publications, etc.—One thousand four hundred and ninety-three prints were made for officers of the various Divisions, to illustrate reports, journal articles, miscellaneous booklets/pamphlets, and for dairy cattle herd-record purposes.

Photographic Aids in Show Exhibits.—Most of the Show Exhibits mentioned under "Display Artist/Designing Services" were assisted by photographic aids.

Series of 35-mm. slides were captioned and special-mounted for display in automatic projectors. Others were enlarged to 12 in. x 10 in. transparencies, some coloured under contract, for display in transparency light-boxes. Others were enlarged as 23 in. x 17 in. prints, card-mounted and captioned, for display on exhibit walls.

Special 35-mm. Slide Sequences, for Lecture Aids.—All colour slides of veterinary matter were recalled temporarily from country offices, and in collaboration with Animal Industry Division, special selections were made for replication.

The replicated sets will be distributed amongst District Veterinary Officers and Pastures Protection Board Veterinary Inspectors, for extension use. Slides acquired by veterinary staff in the Meat Inspection Service, Homebush, were of special value in this project.

At Seven Hills Poultry Experiment Station a special sequence on artificial insemination of poultry was photographed by the Photographic Aids Officer.

To provide a pool of slides for country officers' use in weeds exhibits, a series of forty colour slides photographed by the Special Agronomist (Weeds) has been captioned and special-mounted for use in automatic projectors.

Central Photographic Library.—As the results of subject-matter officers' photography pass through the Photographic Aids section, a selection occurs—to provide for additions to the Division's central photographic library. By this means, 434 titles were added in 1958-59, compared with 634 in 1957-58 and 468 in 1956-57. This library now totals 3,176, comprehensively cross-indexed.

16-mm. Cine Film Productions.—Two 16-mm. cine colour films—"Serrated Tussock" and "Skeleton Weed"—on contract production were completed by the contractor.

For a cine colour film "T.B. in Cattle" the Photographic Aids Officer, who will do the filming personally, has completed the script in collaboration with Animal Industry Division. Locations have been organised.

Colour film footage of Guernsey cattle was shot, on South Coast locations, at the request of Dairy Division of the N.S.W. Guernsey Breeders' Association. The footage is to be used in a film being made by the Guernsey breed society in England.

Cine Film Library Service.—There are now 209 titles in the Division's 16-mm. cine film library, an increase by nine.

Liaison has been maintained with Information Offices and Consulates of other countries, also with the N.S.W. Film Council library and various commercial firms, to secure their films for programmes collated by the Division for use by country officers and Agricultural Bureau Branches. There are about 100 borrowing groups.

Collation and Loan of Film Programmes.—One thousand seven hundred and four films were loaned through the Division's film library. In consequence, 1,227,000 feet of film returned by borrowers was checked and, where necessary, repaired.

The 1,704 films were collated in 691 programmes, compared to 1,852 films in 662 programmes in 1957-58, and 1,084 films in 342 programmes in 1956-57. In many instances a programme was screened several times in the course of the respective loan.

Number of films requested per programme continued to decrease (3.2 in 1956-57, 2.8 in 1957-58, 2.5 in 1958-59). This reflects the increasing number of one- or two-film programmes, providing time for purposeful discussion, to exploit the educational value of the films.

Film Appraisal Screenings.—The Division organised appraisal screenings on twenty occasions, compared with seventeen in 1957-58 and twenty-four in 1956-57.

The appraisal screenings gave subject-matter specialists of the various Divisions the chance to assess the relative extension value of particular films newly under notice; to decide whether the respective film should be acquired for the library or should be borrowed on appropriate occasions or should not be screened in Department of Agriculture programmes or should be screened only with a subject-matter officer present to relate the contents to N.S.W. circumstances, and so on.

Radio in Extension Service

There is one Extension Officer (Radio) in the Section. His aid has been supplemented heavily in country areas by Publicity Officers, country officers of this Division stationed at respective Regional headquarters (see later, "*Regional Publicity Officers*").

Tutorial Services, on Radio as an Extension Aid.—Advice and encouragement have been given to officers of subject-matter Divisions, in the field and by correspondence, and at Extension Schools; in radio presentation, voice use, programme collation, operation of tape recorders, etc.

Advisory itineraries were fulfilled in the Western and the South Coast and Tablelands Regions. Sessions were conducted, with practical work, at the Extension Service/Methods School for Departmental officers, two Extension schools for Veterinary Inspectors, and the schools conducted for University of Sydney and University of New England undergraduates in agriculture or rural science.

Advice on tape recorder use and management has been given also to officers of other Departments.

Taxation Department officers, prior to their advisory itineraries in rural areas, were also given advice and practical experience in presentation of material, script preparation, voice usage, and kindred radio elements.

Head Office Tape Recordings.—Thirty-one talks by or interviews with subject-matter specialists were tape-recorded in the radio room at head office for release to country officers, to supplement the latter's local radio material.

Liaison with Radio Stations.—When in country areas the Extension Officer (Radio) has visited the respective radio stations for liaison. In Sydney he had frequent contact with the rural and news departments of the A.B.C., 2GB, 2UE and 2CH.

Tamworth Radio Development Co. Ltd., managers of 2TM Tamworth, key station in the New England Network, donated funds for Departmental purchase of a particular type of field microphone, for use by field officers in Northern Region. The management of 2HD Newcastle donated a headphones set to the Mid-Coast and Hunter Region of the Department. These are some indications of rural radio stations' appreciation of broadcasting by the Department's officers.

New Radio Programmes.—Last year's report indicated that twenty-seven stations in N.S.W. broadcast farm sessions, with Department of Agriculture officers featured at least weekly. Eight of these stations have sessions in which the officers participate twice weekly; one of the stations—thrice weekly; another—six times; and another—eight times per week.

In the past 12 months, six new regular weekly radio programmes have been brought into being either by Regional publicity officers or district officers. One of these programmes is broadcast over three stations.

Public Address Systems.—There are some 50 Public Address Systems, for conference and field day usage, amongst the country offices. They are equipped with lapel as well as standard microphones. Inevitable servicing needs of the equipment has been arranged by the Division through Government Stores Department's Radio and Motion Pictures Branch.

Regional Publicity Officers

There are now nine Regional Publicity Officer positions, by virtue of salaries provided from Commonwealth Agricultural Extension Services Grant funds. The Publicity Officer positions were established within the Division of Information Services in 1953 but were transferred to the Chief, Regional Extension Services in 1957. In July, 1958, they were restored to the Division of Information Services.

The Regional Publicity Officers are located, respectively, at Cowra, Goulburn, Gunnedah, Leeton, Lismore, Maitland, Orange, Tamworth, and Wagga.

As decentralised representatives of the Division of Information Services, they have functioned (i) by processing, or assisting field officers of subject-matter Divisions to process, material for press and radio usage, (ii) by organising opportunities for use of mass and group media by the subject-matter officers, (iii) by assisting rural groups' organisation of activities affecting extension service, (iv) by encouraging the interest and developing the skills of subject-matter officers in using mass and group media.

Illustrations of their work in general are provided by the following collations, respectively from the Publicity Officer, Western Region (Orange headquarters) and the Publicity Officer, Northern Region (Tamworth headquarters).

Publicity Officer, Western Region—

Radio.—Regular sponsored sessions over five commercial stations in the Region, and weekly talks over the A.B.C. regional station at Orange; 723 individual broadcasts (714 in the previous year), accounting for some 58 hours of broadcasting per year; special test broadcasts at intervals, to ascertain the extent of listeners—with a pleasing response, in enquiries for publications and other offered information, from all over N.S.W. and parts of adjoining States.

Press.—329 individual press items (410 in the previous year) in the course of 45 weekly columns (133 items) and 196 other releases; 28 newspapers in the Region and five Capital-based rural papers are serviced; the lower number of press releases this year reflects a tendency to use radio more and newspapers less.

Show Exhibits.—Special topical themes were organised and displayed in exhibits at Dubbo, Molong, Bathurst, and Orange Shows; each exhibit was serviced by an "enquiry centre".

Agricultural Bureau.—Thirty-one branches of the Agricultural Bureau in the Region, including three organised this year, were serviced; service in the form of help in drawing up branch activities for 12 months ahead and in organising those activities and publicity; assisted two Divisional Conventions of the Agricultural Bureau—Macquarie Convention at Eurimbla and Mitchell Convention at Meroo; assisted the organisation of a special conference of women members of the Bureau, at Orange; co-operated with Rockley branch in the pilot "extension programme planning" project.

Major Field Days.—In addition to assisting the organisation of each Agricultural Bureau branch field day, and personal attendance to help at 15 of them, the Publicity Officer helped the promotion and execution of Orange Machinery Field Day which drew 22,000 people over the three days, and the Orange Show Society's Field Days—one on beef cattle and one on sheep and wool.

Publicity Officer, Northern Region—

Radio.—181 recordings were prepared for broadcast, and full advantage taken of regular broadcasts offered by the A.B.C. regional station at Tamworth, the commercial stations Inverell, Tamworth and Armidale, and neighbouring stations—outside the Region—at Gunnedah, Moree and Taree; the Departmental contributions accounted for some 55 hours of broadcasting per year.

Press.—256 individual press items, excluding *ad hoc* comments or views sought by press and radio newsmen; several fortnightly columns, including "Veterinary Notes", "Ruralettes", and "Poultry News and Views".

Show Exhibits.—Special topical themes were organised and displayed at Tamworth and Armidale Shows; each serviced by an "enquiry centre".

Help to Organisations.—Only one new branch of the Agricultural Bureau was formed, in a Region which could benefit by having many more; but the Publicity Officer worked closely with many organisations affecting extension service, including the Bureau, Soldier Settlers' Association, Graziers' Association, Farmers & Settlers' Association, Apiarists' Association, the Rural Bank, and the Royal Agricultural Society, in organising field days, schools, competitions, and film evenings.

Major Field Days.—Special help was given a Tamworth committee of the Agricultural Bureau to organise the annual Tamworth Machinery Field Days which drew several thousand people; a series of three half-day field sessions on weeds were conducted, at Tenterfield, Glen Innes and Emmaville, for representatives of Pastures Protection Boards, Shire and Municipal Councils, Railways Department and commerce; the three weeds-days arose by request from a Weeds Refresher Course (two days) conducted at Tamworth.

A brief sketch of the activities of each of the other Publicity Officers' activities would be comparable with the foregoing two, selected at random.

Agricultural Bureau—Extension Groups

Co-operation with Departments and Institutions.—The annual report of the Agricultural Bureau State President has acknowledged the effective working partnership between Agricultural Bureau units, as extension groups, and the Department of Agriculture; especially the teamwork with Regional Supervisors and district officers of the Department in the Department's Agricultural Regions. The Bureau President has also freely acknowledged the services rendered by other Government Departments, for example the Department of Conservation, the C.S.I.R.O., and the Commonwealth Department of Primary Industry, and by Universities and commercial organisations.

New Bureau Branches.—Twenty new branches were formed in 1958-59, more than in any other year in this decade. One branch disbanded.

Affiliation of Branches, with State Advisory Council.—One hundred and thirty-one branches were financially affiliated with their State Advisory Council by 31st May, 1959; compared with 119 at that date in 1958 and 111 in 1957. About the same number of branches are unaffiliated, but still active in local agricultural extension service.

Divisions Represented in State Advisory Council.—Fifteen of the 19 geographic Divisions of the Bureau were represented in the State Advisory Council this year. Upper Murray, Central Murray, Illawarra and New England Divisions lack the branches for representations.

The 15 Divisional Councillors, plus an Eastern and a Western Woman Councillor, and the Past President and President, comprised a Council of 19 members. Their travel and sustenance expenses for four meetings (three in Sydney and one at Hawkesbury College) were met by the Department. Attendances averaged 78 per cent. of the potential.

Whilst the Department's expenditure on State Advisory Councillors' attendance at the four meetings per year accounts for near to 50 per cent. of the Division of Information Services' travel and sustenance appropriation, the reverse side of the picture is also interesting. The Councillors graciously incur a much greater expenditure, mostly from the personal pocket but in part from the Advisory Council account, in their work as volunteer extension organisers in their Divisional territories. Of this they are justly proud.

They incur big car mileages, and hotel bills, and loss of working time, of which they do not seek to make re-imbursement claims.

Bureau Divisional Conventions.—Ten educational Conventions were conducted, with attendances ranging from 100 to 300. Four of the Conventions were of two days duration and included field sessions.

The trend towards a specific theme was again marked this year, e.g., Southern Tablelands' was a "Beef Cattle" Convention, Namoi's was an "Irrigation in the North West" Convention, Cumberland's was an "Orchard Cultivation and Drainage" Convention, and Clarence Convention concentrated on "Small Crops Production".

Bureau State Congress.—Approximately 300 delegates, men and women, and visitors, attended the three days' programme of lectures and demonstrations at the 1958 State Congress; residential, as usual, at Hawkesbury Agricultural College during the winter vacation.

Agricultural Bureau Short-term Schools and Courses.—Three Rural Leadership Schools, an Irrigation School, and five Short Courses comprising a night per week for five or six weeks, were conducted. There is later reference to these, under "Short-term Schools and Courses".

Agricultural Bureau branches also accepted chances offered by short-term schools promoted by other organisations; the University of New England, the University of N.S.W., and the Department of Agriculture (at the Agricultural Colleges and Yanco Experiment Farm).

Bureau Branch Activities.—Most of the Divisional conventions and short-term schools and courses to which earlier paragraphs refer were outcome of local branch efforts, responsibilities having been delegated to the Bureau branch in the locality where the event was to be sited.

Almost every Bureau branch continued to promote monthly meetings for the typical range of activities—lectures, discussion groups, film and slide screenings, debates, and the like. Most also promoted at least one field day; some in association with farm demonstration projects of the Department. The branch activities have comprised in total a very big voluntary contribution by honorary office-bearers and their fellows, to the extension organising force in this State.

Bureau Branch Ownership of Cine Film Projectors.—Some forty-five branches now own 16-mm. cine film projectors, through funds raised by local efforts. Two more branches—Wirrimah and Baradine—purchased a projector this year. The total almost equals that of Department of Agriculture projectors in country offices.

Thus, in effect, the Agricultural Bureau has doubled the number of cine film projectors available primarily for agricultural extension service in N.S.W.

State Advisory Council Activities.—Items under attention included the Beef Cattle Breeders' Competition; Short-term Schools and Courses for farmers; Sheep and Wool courses conducted by Technical Colleges; shortage of district agronomists; the Department's Uniform Pasture Survey and Extension Trials; the need for more advice on agricultural machinery; research into fruit fly control; the Soil Conservation Service's plant hire scheme; education for handicapped children; assimilation of migrants; subject-matter of meetings of the Associated Country Women of the World; means of catering for the interest of women in Bureau branches; the need for more organising staff; and possible changes in Bureau Divisional boundaries.

Bureau Representation in Other Bodies.—The Bureau was represented, by a Councillor or a professional officer, respectively, in the N.S.W. Co-operative Societies Council, the Council of the N.S.W. Bush Nursing Association, the Primary Producer Associations' Council of N.S.W., the State Council of Junior Farmer Clubs, the Milk Zone Dairy Farm Advisory Committee, and the N.S.W. Advisory Board of Adult Education.

Scholarship Award (H.A.C.) and J.F.C. Trophy.—The Agricultural Bureau Advisory Council continued its Scholarship Award, involving an annual expenditure of £170, to maintain a selected student at Hawkesbury Agricultural College.

It also continued the annual award of five guineas for a trophy to the winner of the Junior Farmer Clubs' State Maize Growing Championship.

Beef Cattle Breeders' Competition.—One hundred and forty-three entries were attracted by the 1958-59 Competition conducted by the Agricultural Bureau with the aid of the Rural Bank of N.S.W. and the Department's Animal Industry Division.

The State Judge reported that the field discussions were a major contribution to extension services in the beef industry.

Extension field days in association with district judging drew attendances averaging seventy.

Short-term Schools and Courses for Farmers

The Public Service Board and the Treasury have approved an increase in establishment, to provide a position designated "Extension Officer (Organiser of Short-term Schools/Courses)". It calls for a graduate applicant.

Meantime, the Agricultural Bureau Organiser and Assistant Organiser have continued to work with Agricultural Bureau localities in the promotion of short-term schools and courses.

Three Rural Leadership Schools, an Irrigation School, and five courses were promoted for and with the Agricultural Bureau this year.

One Leadership School (5 days, residential) was for men. It was held at Hawkesbury College in July, 1958, and attended by 35 men. Another (8 days, residential) was for women. It was held at Newport in January, 1959, and attended by 29 women. Another (3 days, non-residential) was held at Casino "between milkings". It drew 28 regular attenders, for a curriculum on public speaking and meeting procedures.

The Irrigation School (5 days, non-residential) was held at Wee Waa in Namoi Division. It drew a regular attendance of 40 farmers from north-western farms; a pleasing reward for the honorary organisers in Merah North branch of the Agricultural Bureau.

The five short courses, comprising one lecture/discussion night per week for five or six weeks, were held at Marulan (forty-five attended), Ando (forty-five), O'Connell-Wisemans Creek (thirty-eight), Somersby (sixty) and Kulnura (forty). The Marulan and Ando courses were concerned with "Animal Physiology and Nutrition", and the three others with "Soils and Botany".

In June, 1959, the overall responsibility for the Department's short-term schools, some for officers and some for farmers, at Yanco Experiment Farm, was passed to Division of Information Services. Three, for farmers, are in hand—respectively for August, September, October, 1959; each to be of two weeks' duration.

"Extension Programme Planning"

Some 80 per cent. of the affiliated Bureau branches now commit to paper at the outset of their year, and print or otherwise process in most cases, a programme that defines their monthly group activity for the twelve months ahead. Through this "branch programme" they are better able to delegate, amongst the rank and file members, organisational responsibilities for various aspects of forthcoming meeting.

Apart from that facet of "programming", pilot projects in the more comprehensive meaning of "extension programme planning" for the locality, were initiated in four Bureau branches in 1957-58 (Rockley and Tarana, in Mitchell Division; and Backmede-Fairy Hill and Kyogle, in Richmond-Tweed Division).

The pilot projects were increased in 1958-59, to include Rappville and Old Bonalbo branches, in Tweed-Richmond Division. The Assistant Agricultural Bureau Organiser has accepted special responsibilities in these pilot projects, in collaboration with the respective Regional and District staff of the Department.

In the Rockley (Mitchell Division) and the Backmede-Fairy Hill and Kyogle (Richmond-Tweed Division) pilot projects, encouraging progress is reported. Rockley branch has in fact achieved remarkable results; leading a vigorous campaign by farm people, State and local government bodies, and commercial firms, towards control of Serrated Tussock—the locality's immediate major problem.

When new Bureau branches were inaugurated this year in Mitchell Division and Richmond-Tweed Division, the respective new branch was quickly led by local Departmental officers into a modified "extensive programming planning" procedure. There has been an immediate feeling of "justification of existence" in the new groups.

Women's Extension Service

Mass and Group Media.—Earlier paragraphs of this Report imply some of the means by which a women's extension service was maintained despite the establishment strength, one officer, e.g. through women's interest articles in twenty-nine of the fifty-two weekly issues of *Press Copy*, through tape recordings distributed to country officers for use in their local farm radio broadcasts, and through women's sessions at each Divisional Convention/Field Day of the Agricultural Bureau.

In addition, the officer has advised many Bureau branches and Experiment Farm Managers and other field officers concerned with field day programmes, on where they might secure suitable speakers/demonstrators—some in other Departments (e.g. Health, Education, Technical Education), some in commerce, and some being individuals with special talents.

Rural Women Help in Programming.—Two developments of special interest occurred amongst women members of the Agricultural Bureau.

One was a discussion ("Women in the Agricultural Bureau—what we can do and learn together?"), featured by the Women's Service officer at each Bureau Divisional Convention in 1959 to find out what the womenfolk want in their Bureau activity programmes. Each discussion was productive; revealing and giving priorities to topics wherein the rural women want assistance and additional knowledge.

The other development was as a "Special Conference for Agricultural Bureau Women Members", sponsored by the Western Agricultural Region at Orange. Ten of the twenty Agricultural Bureau branches in the Region sent delegates to discuss "needs" with Regional staff of the Department and Bureau staff. The women's conference project will be repeated by Western Region and taken up by other Regions.

Overseas Studies by Women's Service Officer.—Senior Extension Officer (Women's Service) Miss N. M. Foskett resumed duties in October, 1958 after five months' overseas. Her overseas studies comprised a three months' course in the U.S.A. on "Developing Leadership in Home Economics Programmes"; a three weeks course on "Communication", provided under the U.S. National Project in Agricultural Communications (N.P.A.C.), and en route visits to the Scottish Rural Women's Institute and the Home Economics Section of F.A.O., Rome.

Whilst in the U.S.A., Miss Foskett also participated in the Ninth International Congress on Home Economics, and the Annual Meeting of the American Home Economics Association.

Extension Service/Methods Training

Continuing Tutorial Effect.—The Division of Information Services continued to exercise a day to day training effect on subject-matter officers of other Divisions; e.g. through the tutorial advice of the Photographic Aids Section, the Radio Section, the Bureau Organising staff, the Editorial staff, and the Regional Publicity Officers.

Special Schools.—The Division has organised and provided the tutorial staff for the following Training Schools:—

Pre-Service Training—

Residential, Extension Service Methods School (6 days) for University of Sydney 2nd year Agriculture students.

Residential, Extension Service Methods School (6 days) for University of New England 2nd year Rural Science students.

Residential, Extension Service Methods School (5 days) for Wagga Agricultural College students.

In-Service Training—

Residential, Extension Service Methods School (11 days) for Department of Agriculture officers (40) and J.F.C. Supervisors (4).

Residential, Extension Service Methods Schools (two, of 5 days) for Pastures-Protection Board Veterinary Inspectors (17 at each school).

Extension Service Examinations

Examinations in Extension Methods.—Seventeen field officers, candidates for promotion from the Grade II to Grade III salary range, submitted to the written examination paper on "Extension Service" required under Public Service Board Regulation 124. Candidates were required to have attended previously a Departmental School on Extension Service/Methods.

Twenty-two essays, by thirteen officers, candidates for promotion above the second year salary rate in Grade I, and sixteen essays by sixteen officers for promotion from Grade I to Grade II salary were examined for "clarity and quality of expression" as affecting extension service.

Miscellaneous Representation

The Divisional Chief represented agriculture in two State agencies affecting adult education, viz. the N.S.W. Film Council, and the N.S.W. Advisory Board of Adult Education.

The Agricultural Bureau Organiser represented the Bureau in the State Council of Junior Farmer Clubs, the Rural Education Committee of the N.S.W. Primary Producers Union, and the Milk Zone Dairy Farm Advisory Committee.

The Senior Extension Officer (Women's Service) represented the Agricultural Bureau in the Council of the N.S.W. Bush Nursing Association, the Good Neighbour Council, and in N.S.W. Country Women's Association committees.

REGIONAL EXTENSION SERVICES

The objective, nine Agricultural Regions for decentralised administration, has been achieved. The last, North Western Region, was established on 5th December, 1958, with headquarters at Gunnedah.

County of Cumberland and neighbouring districts extending north to Gosford and south to Picton are close to head office. They have not been included in any Region.

As a record of particulars concerning each Region in this the year of completion of the current scheme, the following information is listed:—

Southern Region: R. C. Madsen, Regional Supervisor.
Headquarters: Wagga; established, 3rd February, 1953.

North Coast Region: S. R. Ballard, Regional Supervisor.
Headquarters: Lismore; established, 20th May, 1953.

Western Region: B. D. Ament, Regional Supervisor.
Headquarters: Orange; established, 10th December, 1953.

South Coast and Tablelands Region: R. W. Shelley, Regional Supervisor.
Headquarters: Goulburn; established, 14th April, 1955.

South Western Region: G. A. Crawford, Regional Supervisor.

Headquarters: Leeton; established, 10th November, 1956.

Northern Region: R. D. Eastoe, Regional Supervisor.

Headquarters: Tamworth; established, 14th February, 1957.

Mid Coast and Hunter Region: E. C. Connor, Regional Supervisor (following D. W. Crowfoot, transferred to position of Principal Dairy Officer, School of Technology, Hawkesbury Agricultural College).

Headquarters: Maitland; established, 12th June, 1957.

Mid Western Region: F. J. Nicholson, Regional Supervisor.

Headquarters: Cowra; established, 31st October, 1957.

North Western Region: J. A. O'Reilly, Regional Supervisor.

Headquarters: Gunnedah; established, 5th December, 1958.

It is of interest that the Regional Supervisors have been recruited from the four "industry" Divisions of the Department; six from Division of Plant Industry, and respectively one from the Divisions of Animal Industry, Dairying and Horticulture.

Personnel in Regions

Some 292 officers stationed in country districts are for extension and closely allied services.

Veterinary Officers, staff at the Agricultural Colleges and the Experiment Farms/Stations and the Research Institutes, and office personnel, are not in this total, though they also affect extension.

Two hundred and sixty of 292 officers are in Agricultural Regions. Those who are not in Regions are, mainly, at Parramatta, Gosford and Dareton. The accompanying tabulation summarises the position, as regards field personnel in relation to Regions.

Field Personnel In Regions

Type of Officer	In Rural Areas	Not in Regions	In Regions									
			Total	South-ern	North Coast	Western	South Coast and Tablelands	South-Western	North-ern	Mid Coast and Hunter	Mid-Western	North Western
Regional Supervisor	9	..	9	1	1	1	1	1	1	1	1	1
Agronomist	34	2	32	4	4	4	4	5	4	2	3	2
Livestock Officer (Sheep & Wool)	15	..	15	2	..	2	2	2	2	..	3	2
Livestock Officer (Pigs)	6	..	6	1	2	1	..	..	1	1	..	..
Livestock Officer (Poultry)	3	1	2	1	..	..	..	..	1	..	..	..
Livestock Officer (Beef Cattle)	1	..	1	..	..	1	..	..	1	..	..	..
Livestock Officer (Agriculture)	3	..	3	1	..	1	..	..	1	..	..	..
Dairy Officer	32	1	31	3	12	2	4	2	2	6	..	..
Fruit Officer	18	7	11	1	3	1	..	4	1	..	1	..
Entomologist	3	1	2	..	1	1	..	..	..	..	..	..
Pathologist	2	1	1	..	1	..	..	..	..	..	..	..
Publicity Officer	9	..	9	1	1	1	1	1	1	1	1	1
Italian Liaison Officer	1	..	1	..	..	..	1	1	..	..	..	..
Survey Officer (Milking Machines)	3	..	3	..	1	..	1	..	..	1	..	..
Seed Certification Officer	6	..	6	2	..	..	3	..	..	1	..	..
Demonstrator, Mobile Mechanisation Unit	1	..	1	..	..	..	..	..	1	..	..	..
Fruit Inspector	35	11	24	1	9	3	1	6	2	1	1	..
Herd Organiser	8	1	7	1	3	..	1	..	..	2	..	..
Dairy Ext. Grant	7	..	7	1	3	..	1	..	..	2	..	..
Field Assistant	23	1	22	3	2	4	2	5	3	1	1	1
Herd Recorder	73	6	67	7	24	1	14	4	1	16	..	..
Total	292	32	260	30	67	23	35	31	21	35	11	7

Regional Advisory Committees

On the establishment of each Region, the Minister for Agriculture has invited seven non-Departmental persons to become members of an Advisory Committee for the respective Region; with the Regional Supervisor as Chairman.

The nine Regional Committees each meet three or four times a year, and forward to the Minister advice and kindred comment on matters of agricultural interest in the Region.

The North Western Agricultural Regional Advisory Committee has been formed this year; the inaugural meeting was held at Gunnedah on 13th February, 1959.

Regional, Publicity Activities

The "Regional Publicity Officers" have been subject of report under "Division of Information Services."

Their statistical returns show that the Regions, in aggregate, issued 3,000 publicity statements during the year; and that country newspapers used from 50 per cent. to 90 per cent. (ranging as between Regions) of the material issued.

Practically every rural radio station in N.S.W. now uses material supplied by officers in the Regions, and there are more sponsors for Department of Agriculture programmes than can be catered for.

Field Days and Conventions

Regional Supervisors have vigorously pursued group extension through conventions, meetings, refresher schools and courses, and field days. Most of these functions have been arranged in co-operation with a farmers' organisation.

Frequently the respective function has been concerned with one facet of agriculture, for example "pastures", "dairying", "animal husbandry", "weeds", etc. The more or less specialised type of programme has been attracting audiences with particular interests, the farmers' time not being taken up by talks on subjects in which they have had less interest. Speakers and/or demonstrators have been drawn from the Department of Agriculture, the C.S.I.R.O., the universities, and commercial and other organisations with agricultural interests, and from the farm people.

Public address systems, and cine and still projectors, and other audio/visual aids have enhanced the effectiveness of sessions.

Public Relations

Previous to establishment of the Regions there was no readily identified, representative spokesman for the Department of Agriculture in country districts. Field officers of the different Divisions were variously accepted as such. Now, however, all types of organisations and bodies in a Region approach the respective Regional Supervisor on matters concerning the Department of Agriculture. This has been an encouraging and significant development in decentralisation.

Many senior officers in regions are members of private and public bodies taking interest in civic affairs.

Country Show societies are being given better service.

Publicity officers maintain close liaison with newspaper editors and managers of radio stations.

All of these contacts, including those persons and organisations not primarily in farming pursuits, and the press and radio publicity, have made the Department of Agriculture better known and appreciated throughout the State.

Extension Aid Equipment

The Division of Information Services has technical officers to advise and otherwise service field staff on matters concerned with field photography, screening of films, radio broadcasting, tape recording, use of public address systems, staging of agricultural exhibits, and organisation of group extension media.

At the majority of country offices where extension officers are stationed, there is a range of extension aids including cameras, cine film projectors, slide projectors, public address systems, tape recorders, and accessories. The Regional Publicity Officer also advises field officers on these extension aids and co-operates with the officers in their use.

At each Regional headquarters there is also a select library of 100 to 200 agricultural books; with smaller collections at district offices. A duplicating machine is located at each Regional Office.

Each Region has one or more Field Assistants, to assist the professional staff, and a utility truck; the truck rigged to operate with a mobile public address system—an invaluable aid at field days.

Much of the Field Assistant's time is occupied in arranging, sowing, maintaining, harvesting, recording, etc., demonstration plots. Consequently, the professional officers have more time for extension duties.

Office Accommodation

Each year there has been an improvement in the office accommodation position in the regions. In the nine regions there are forty-six offices, and in only one or two instances is the accommodation critically overcrowded or unsatisfactory. Action has been initiated to increase the accommodation there.

An outstanding development in office accommodation is the new office building at Wagga; officially opened by the Premier of New South Wales in September, 1958. Department of Agriculture occupies the ground floor, as Southern Region Headquarters, whilst the Department of Education is located on the first floor.

Flood and Bush Fire Relief Activities

All applications by share and tenant farmers for financial relief have been referred through the Regional Supervisors to district extension officers, for report. During the past year about 150 applications from the north coastal and western districts were thus reported upon by officers of the Department of Agriculture.

Some Particular Activities in Regions

SOUTHERN REGION

Appointment of Dairy Officer to Albury.—The appointment of a Dairy Officer to Albury brought about a marked improvement in dairy extension in that part of the region. It permitted more contacts and closer liaison with Victorian Officers and relieved the District Dairy Officer and Dairy Officer, Wagga, to supervise activities elsewhere within the region.

Pasture Seed Industry.—By comparison with the previous year, there were twenty-six more growers and 12,400 more acres in the Subterranean Clover Seed Certification Scheme. There was again a heavy percentage of withdrawals; due to insufficient contractors for harvesting, and to farmers reserving areas for fodder conservation. A total of 1,096 tons of certified seed was harvested; compared with 1,100 tons in 1957-58 and the record, 1,700 tons, in 1956-57.

There has been further development in local manufacture of harvesting machines to improve seed quality. A tendency towards more grower-owned harvesting plants has been noted.

There was a record yield of *Phalaris tuberosa* seed, a total of 20½ tons.

Illegal Sale of Under-standard Subterranean Clover Seed.—Tremendous demand for subterranean clover seed of various strains, and introduction of the Department's Subterranean Clover Seed Certification Scheme, led to the establishment of this important seed industry in the Southern Region in 1953. The industry quickly developed, to a peak production worth £½ million for the year concerned. It is now at a lower and more stable figure.

Rapid development of the industry has been accompanied by problems. Many problems have been ironed out but one—the illegal sale of under-standard seed—assumed major proportions. It constitutes a threat to the industry and to the Department's Seed Certification Scheme.

It now appears that a more regulatory stand may be needed, to curb a minority of growers and cleaners who this season indulged in large-scale illegal sale of under-standard seed throughout the southern part of the State.

The Regional staff have been unable to secure sufficient evidence this season to launch prosecutions, but their investigations have had a beneficial effect.

NORTH COAST REGION

Additional Staff Appointed.—The staff position has improved with the appointment of a Plant Pathologist to fill the vacancy at Murwillumbah, the appointment of a Livestock Officer (Pigs) with headquarters at Grafton, and participation (for training purposes) by two Experiment Farm agronomists in extension work. The latter's participation included field duties with District Agronomists and extension group activities such as Agricultural Bureau meetings, and field days.

Agricultural Bureau Development in this Region.—Five new Branches of the Agricultural Bureau were formed, bringing the total to twenty-five in the Region. The new Branches are at Rappville, Old Bonalbo, Tregagle, Rock Valley, and Bexhill.

Extension officers in the areas served by Bureau branches have given them excellent support; and the Regional Publicity Officer, acting as Bureau liaison officer, has done much to sustain interest within the branches.

A Richmond-Tweed Divisional Council of the Agricultural Bureau was re-inaugurated, and organised a very successful Farmers' Leadership School. A Divisional Convention is also being organised by this body.

Revival of the Bureau movement in this Region has greatly enhanced the relationships between the farming communities and the Department.

Banana Growers' Federation Donate a Greenhouse.—Towards the end of the year the Banana Growers' Federation donated a £1,500 greenhouse-insectary for Division of Science Services officers in the Region, at Murwillumbah. The Regional Entomologist's and Plant Pathologist's research into the control of insect pests and plant diseases have been facilitated by the donation.

The Federation has established, also, a research fund of £300, to meet current purchases in the course of day-to-day research work.

WESTERN REGION

Improved Office Accommodation at Orange.—Efforts to provide additional accommodation at Orange have been rewarded. Ophir County Council, Orange, will provide accommodation for this Department's Regional office, and the District Veterinary Officer, in the Council's new headquarters building—expected to be ready for occupation by March or April, 1960. Approximately 2,734 sq. feet, including corridor and public space, will be provided, compared to 1,128 sq. feet in the present offices.

Office Staff Adopt a Uniform.—The seven members of office-assistance staff at Orange, including the staff of the District Veterinary Officer, have voluntarily adopted a system of summer and winter uniforms in agreed-upon colours.

Agricultural Bureau in the Western Region.—Three new branches of the Agricultural Bureau were formed in the Region—Gulargambone, Cooyal, and Lue, bringing the total of active branches in Western Region to thirty-one.

A Convention of Agricultural Bureau women members in the Region was held at Orange in April, 1959, the first convention of this type to be held in New South Wales. It was suggested by the Publicity Officer at Orange, to stimulate the interest of women in the Bureau movement and to assist them in defining their extension needs. This convention was highly successful, and may become an annual event in Western Region.

Orange Machinery Field Day.—Officers of Western Region again played major roles in organising and conducting the Annual Machinery Field Day at Orange, in November, 1958. Aggregate attendance over the three days was 2,200 persons, with 11,000 on the second day.

The Regional Supervisor was a member of the Management Committee, Chairman of the Comparative Demonstration Programme Committee, and a member of the New Implement Award Committee.

The Department conducted an information centre in a large marquee. Organised exhibits in the marquee were staged by the Soil Conservation Service, Water Conservation and Irrigation Commission, Forestry Commission, Orange Technical College, and the Ophir County Council.

Serrated Tussock Control; Extension Activities.—For years, serrated tussock has been the most important weed problem in Western Region. The problem has had a lot of attention from Departmental officers, the Upper Macquarie County Council, the Agricultural Bureau Branches at Rockley and Burruga, and individual landholders.

Approximately thirty demonstrations (under "Agricultural Extension Grant Project No. 24") have been established in the infested areas. They have had considerable extension value.

A major development in the extension campaign for tussock control, particularly on non-arable land, has come as a result of combined efforts of Departmental officers, Upper Macquarie County Council and the Rockley Branch of the Bureau. They have organised the bulk supply of superphosphate and seed, and its location on air strips, the provision of adequate landing strips, aerial operators; and landholders have been led to make the most economic use of all these facilities.

SOUTH COAST AND TABLELANDS REGION

Sheep and Wool Officer Appointed to Cooma.—Another Livestock Officer (Sheep and Wool) has been appointed to South Coast and Tablelands Region. His headquarters are at Cooma.

This appointment will have far-reaching results for graziers in this Region. Previously the South Coast and Tablelands Region was covered by only one Livestock Officer.

Office Staff Win Debating Championship.—Two members of the Goulburn Junior Farmers' Club team of three which won the Junior Farmer State Debating Contest at Mudgee on 24th

July, 1958, came from office-assistance staff at Goulburn office—Miss W. Newtown, of the District Veterinary Officer's staff and Miss S. Read of S. C. & T. Regional headquarters.

Agronomy Course for Goulburn Technical College.—The District Agronomist at Goulburn conducted a twelve months' Agronomy Course for the Goulburn Technical College. It is the second course of its type to be held in Goulburn, but for this course the instruction was given at Wollongorag Station, about 12 miles from Goulburn.

Department of Technical Education gave a special approval for this arrangement, as most of the twenty-two enrollees for the course are employees of the Wollongorag Pastoral Company.

This Company has taken a unique step in providing special training for a number of young men (including graduates of Hawkesbury Agricultural College and Hurlstone Agricultural High School) to fit them for supervisory position on properties owned by the Company. In addition to the Agronomy Course, the young men concerned are doing Welding and Sheep and Wool Courses, through the Technical College.

Tree Planting Demonstrations.—Arrangements were made in conjunction with Forestry Commission for establishment of four new tree planting demonstrations in Cooma district and for continuance of one commenced in the previous year on the property of a member of the Regional Advisory Committee.

The demonstrations will incorporate a number of objectives, including the testing of various species, establishment methods, and various after-planting treatments. Some naturally treeless areas in the relatively low rainfall district around Cooma will be chosen.

The tree planting demonstrations are outcome of discussions some two years ago between the South Coast and Tablelands Region Advisory Committee and Forestry Commission Officers.

SOUTH-WESTERN REGION

Italian Liaison Extension Officer.—An English-speaking Italian (appointed in January, 1954) acts as Liaison Extension Officer between extension officers in the M.I.A. and the Italian farming community.

Of the 36,000 people in the Murrumbidgee Irrigation Areas, 8,000 are Italians who have taken up residence during the past ten or twelve years. Italians own, farm, share-farm, or lease over 50 per cent. of the horticultural irrigation farms in the Griffith district. Many of them do not speak nor write English, nor understand the language well enough for extension officers to convey technical advice.

The Italian Extension Liaison Officer has continued to render valued assistance. In addition to assisting Regional extension officers, he has been of service to the Rehabilitation Committee, the Tile Drainage Committee, the C.S.I.R.O., and visitors to the Murrumbidgee Irrigation Areas.

He has translated pamphlets on tomato diseases and pack-regulations and translated the new edition of the "Vegetable Growing Guide" a bi-lingual publication now being printed by the New South Wales Government Printer. He has continued the system of Italian summaries for issues of the periodical *Farmers' Newsletter*, and has forwarded material to Italian-language newspapers published in Sydney.

His help has been very valuable to the Griffith District Agronomist in establishing vegetable trials with Italian-origin farmers. The latter comprise 98 per cent. of the vegetable growers in the Murrumbidgee Irrigation Areas.

Farm Machinery Officer.—A Farm Machinery Officer was appointed in August, 1958. He has returned to the Victorian Soil Conservation Authority, after six months' leave of absence for the M.I.A. project; but meantime his work established that a Farm Machinery Advisory Service as conceived by members of Irrigation Research and Extension Committee, can in fact function effectively in the Murrumbidgee Irrigation Areas.

New Irrigation Areas; Effect in Extension Services.—The Coleambally Canal will supply water to, eventually, some 1,000 irrigation holdings in the Coleambally Irrigation Area for mixed farming and horticulture.

An enormous increase in demands on extension staff will commence within the next twelve months, because of increased development in Coleambally Irrigation Area, Cudgel Sandhills near Narrandera, Sandy Creek irrigation district near Berembend Weir, and proposed irrigation development between Hay and Balranald.

Woodlots on Farms.—As a result of woodlot work by the Department, the C.S.I.R.O. and the N.S.W. Forestry Commission, M.I.A. farmers have become very tree-conscious. Farmers are now coming to the Department for advice. Earlier, the Department had to take the initiative.

NORTHERN REGION

Rainfall Recording.—To assess effectively the C.S.I.R.O. cloud-seeding experiments in the Region, 200 additional rain gauges (total now 230) have been placed in the experimental area.

The rain gauges, supplied by and under the control of the Weather Bureau, are at four-mile intervals in the southern area of Northern Region, of which Tamworth is the main centre; and at four to five mile intervals in the northern area, the centre of which is Inverell.

Regional officers have assisted the Weather Bureau and C.S.I.R.O. officers with information as to satisfactory areas, suitable persons, means of access, and with other advice for effective location of the gauges.

MID COAST AND HUNTER REGIONS

Research in the Hunter Valley.—A District Research Agronomist has been appointed, and a Hunter Valley Research Committee has been formed.

Funds donated by Australian Fertilisers Ltd., the Sulphide Corporation Pty. Ltd., and the Hunter Valley Co-operative Dairy Co., have made possible the research agronomy appointment.

Extension Exhibits.—Exhibits were staged at Newcastle, Maitland and Taree Shows. At the request of farmers' organisations Weed Displays were exhibited at Wingham and Wauchope. A service bureau featuring Fruit Fly Control was provided at Singleton. Keen farm interest was shown in all these displays and valuable contacts were made.

MID WESTERN REGION

Mass and Group Media.—Although this Region is relatively new, 466 separate broadcasts were made during the twelve months. In practically every case they were actuality broadcasts and not re-play of tapes. The per week average was nine broadcasts. Two radio stations were involved.

Practically every officer in the Region contributed to the radio sessions.

There was also a big increase in publicity releases for both press and radio use; 337 publicity statements were issued throughout the Region—a per week average of six statements. The statements were prepared by individual officers and in many instances processed by the Regional Publicity Officer.

Fifty-eight field days or conventions were held; with an aggregate attendance of 3,500 farmers. Fifty-one lectures were given by extension officers to farmer groups.

Particular attention was given to branches of the Agricultural Bureau. There are 24 Bureau branches in this Region.

Individual Contacts.—Extension officers personally contacted by farm visits a total of 1,247 farmers.

Shearing School.—A very successful Shearing School (4 days) conducted by the Mid Western Region and sponsored by Cowra branch of the Farmers' & Settlers' Association in New South Wales, was held at Cowra in August, 1958. Enrolment was limited to fifteen.

More Irrigation Projects on Farms.—Farm Water Supply Branch of the Water Conservation and Irrigation Commission has received many requests from farmers in Mid Western Region, for help in planning small irrigation systems for pasture, lucerne, and fruit production.

In Cowra district, supplementary irrigation of pastures and fodder crops was carried out over 4,000 acres; 1,000 acres more than in the previous year. Also, 1,200 acres of asparagus and 200 acres of vegetables were irrigated.

Farmers in all districts of the Region, including fruit growers in the Young district, are aware of the value of even small supplementary irrigation projects.

NORTH WESTERN REGION

Inauguration.—North Western Region, with headquarters at Gunnedah, was inaugurated by the Minister on 5th December, 1958.

Staffing.—Additional positions created to coincide with establishment of the Region were those of Regional Supervisor, Gunnedah; District Agronomist, Moree; Publicity Officer, Gunnedah; Field Assistant, Gunnedah; and Shorthand-writer/Typiste, Gunnedah.

Arrangements have been made for the Northern Region Fruit Officer, Livestock Officers (Poultry, Pigs), and Apiculture), Dairy Officer, Mobile Mechanisation Unit Demonstrator, and Fruit Inspector, to operate throughout the North Western Region.

Accommodation.—Current office accommodation at Gunnedah is to be replaced, the staff to occupy the recently vacated Liverpool Plains Shire Council Chambers. This move will provide sufficient space for all Department of Agriculture staff at Gunnedah.

Extension Impetus.—Considerable progress has been made in group publicity following establishment of North Western Region and the appointment of a Publicity Officer to Gunnedah. There is already excellent liaison with regional press and with radio stations at Gunnedah and Moree.

Previously, Moree, the centre of important agricultural areas, used little radio or press material from the Department of Agriculture. This has changed. Managers of the organisations concerned are anxious to receive material. Sponsorship for a farm radio programme has also been readily obtained.

At important centres in the Region on the Western Division boundary, such as Walgett and Collarenebri, little previous contact has been made with offices of the Department of Agriculture. Since North Western Region was inaugurated, field days organised by local graziers in co-operation with Regional officers have drawn attendances of over 100 persons. Many of the latter have expressed appreciation in writing to the Regional Supervisor. Similar field days have been arranged for other centres in more remote parts of the Region.

Co-ordinated Extension Services

The Co-ordinated Extension Services scheme—commenced in December, 1952, by decision of the N.S.W. Food Production Advisory Committee—co-ordinates the advisory services of officers of the Department of Agriculture, the Soil Conservation Service, the Rural Bank, and the N.S.W. Milk Board.

Officers of these organisations have co-operated in many ways in extending agricultural advice. Frequently they combine to conduct a field day, a discussion meeting, or to determine the course of advice to an individual farmer on the more comprehensive problems.

The Department of Agriculture conducts many conventions and schools for farmers; and generally one or more speakers variously from the Soil Conservation Service, the Rural Bank, or the New South Wales Milk Board, are in the programme.

There are 300 officers in the scheme.

The New South Wales Milk Board established a Milk Zone Production Advisory Council, in which there are representatives of the four organisations in the Co-ordinated Extension Services scheme and representatives of the dairy industry. Farmers in the Milk Zone have formed twenty-five Production Advisory Committees. From these Committees suggestions and recommendations have come to the Council.

The New South Wales Milk Board, on recommendations by the Advisory Council, has conducted milk production competitions in the Milk Zone for the past four years. Prize money amounting to £600 has been donated. The competitions, based on feeding for increased production, have achieved some outstanding results.

COMMONWEALTH AGRICULTURAL EXTENSION GRANT

The Commonwealth Extension Services Grant to the States has operated since 1952. The Commonwealth Government recently decided to continue the Grant until 30th June, 1965; and that as from 1st July, 1960, the per annum amount to the States will be £300,000. New South Wales will receive £75,000 per annum of this allocation.

Usage of the Funds

Demonstration Projects.—In part, the Grant funds are used in demonstration projects, on private farms, to promulgate means of reducing production costs—without necessarily aiming at increased gross production; and also to encourage desired trends in lines or diversity of production.

Some examples of the Demonstration Projects are quoted under a later heading (see "Types of Demonstration Project").

Field Assistants and Motor Vehicles.—Twenty field assistants are employed to assist extension officers in the routine of experiments and demonstrations with crops, pastures, stock, fruit trees, pest and disease control, and in the conduct of field days, conventions, meetings, and operation of extension aid equipment as film projectors, public address systems, and tape recorders.

Eighteen utility trucks are located at different country centres. These are used by field assistants for transport, and carrying of equipment. The value of this assistance to extension officers is considerable. It gives them more time for advisory work fitting their professional qualifications.

Mobile, Mechanisation Demonstration Unit.—This Unit comprises a closed-in motor van fitted with many types of equipment used in general farm maintenance of tractors and machinery. A Demonstrator with suitable qualifications operates the Unit and demonstrates at gatherings of farmers.

Originally stationed at Wagga, the Unit was transferred to Orange for two years, and in March, 1959, it moved to Tamworth. It will operate there for the next two or three years. Many letters of appreciation for demonstrations conducted have been received from farmers' organisations and individual farmers.

Weed Spray Demonstration Unit.—Equipment comprises a utility truck fitted with a spray pump and spray boom. It is operated by a Field Assistant. Although based on Orange, the Unit conducts weed control spraying demonstrations throughout the State. During the past year it has been in the Riverina for much of the time.

Publicity Officers.—One of the most advantageous projects established under the Agricultural Extension Grant is that which covers employment of nine Publicity Officers, one at each of the nine Regional headquarters.

The consequent increase in decentralised initiation of press and radio publicity in recent years has been phenomenal. Almost every country newspaper or radio station in New South Wales is regularly using material provided by extension officers through the Publicity Officers and their duplicating machines and tape-recorders.

Agricultural Trainees at University and Colleges.—During the past year there were twenty-seven trainees at universities and agricultural colleges in New South Wales, taking courses in agriculture or veterinary science, and financed by Agricultural Extension Grant funds. The trainees are a source of recruitment of extension officers.

Agricultural Library Services.—Some 1,200 agricultural reference books have been purchased with Grant funds and located at country offices. Previously, officers in country districts had little chance of seeing certain references without a long wait and certainly could not retain the reference book. All extension officers in the field now have, either at their own district office, or at Regional headquarters, many books relevant to the respective field of work.

An officer in Division of Information Services, provided with photo-copying equipment from Grant funds, helps to improve the central library's service to field officers. The same officer engages also in the 16-mm. cine film library service to field officers and rural groups.

Publications.—A 400-page book titled "Weeds", prepared by Mr. J. N. Whittet, retired Principal Agronomist, re-employed under the Grant as an author, should be available for sale in October, 1959. This outstanding publication includes near to 300 illustrations; amongst them eighty colour plates. It will undoubtedly be used as a text book at universities and agricultural colleges throughout Australia, as well as being a Farmer Handbook. A second book, "Pastures", by the same author, will be similar in size and set-up to the "Weeds" book. The manuscript may be complete by June, 1960.

Another journalist has been employed to specialise in plant industry literature. "Pasture" and "Fodder" books have been prepared and printed, each relevant to the respective district of an extension agronomist. Eighteen have been completed and are in circulation. Sixteen more are in various stages of preparation.

Insect Pest Colour-plate Leaflets.—Mr. E. H. Zeck, retired Systematic Entomologist and artist, has been re-employed, under the Grant, to make colour-plate drawings of the more important insect pests and their effects on plants.

Eight colour-plate leaflets from his block-copy have been printed, and copy for many more is in preparation. It is hoped that a further thirty-two may be printed and in distribution by June, 1960.

Other Employees.—A Farm Machinery Demonstrator, an Italian Extension Liaison Officer, and an Administrative Assistant, are also employed on Grant funds.

Extension Aid Equipment.—Cameras, public address systems, film projectors, slide projectors, tape recorders, and accessories, have been acquired for use by extension officers generally. The Grant funds have been used also to assist extension displays.

Types of Demonstration Projects

Eighty separate demonstration projects, many of multiple-unit character, are being conducted or have been completed under the Agricultural Extension Services Grant.

Pastures.—Pasture demonstrations exceed 1,300 units. The units vary in area from 5 to 50 acres. These demonstrations on farmers' properties have been invaluable for extension field days.

Livestock.—The livestock demonstrations have been concerned mainly with poultry, pigs and beef cattle.

Among the outstanding ones are those in the Bombala and Orange districts concerned with the improvement of beef cattle breeding stock, showing the value of dam and sire selection culling on rate of gain of the progeny.

Production of a heavy, top quality calf at weaning every year is the main function of the beef breeding cow, and ability to do this varies tremendously within any herd. Therein is a practical means of selection, to lift production and financial returns.

Two sets of portable scales, each costing £700, have been provided for the demonstrations; and calves are weighed at birth, throughout their growth period, and finally at weaning time.

The relative mothering ability of the cow, combined with selection for physical features, enables a beef cattle breeder to improve the quality of his herd.

A poultry series of demonstrations is concerned with methods of increasing egg production and thus reducing costs of production. Progress results are excellent and have led to confidence that after a period of years the average egg production per bird in New South Wales will have increased from 150 to 190 eggs per annum in well-managed flocks.

The scheme is based on production of foundation strains of high egg producers at Seven Hills Poultry Experiment Station, multiplication of these improved strains at Hawkesbury Agricultural College, production of improved stock on breeding farms—to upgrade chickens being supplied to commercial egg producers and, to check results, the Random Sample Testing of accredited breeders at Hawkesbury Agricultural College.

Eleven large-scale private breeders are in the scheme and already some strains of hens have consistently shown higher production (20 large eggs per annum) than other strains.

Comments from participating farms have been eulogistic. All breeders report increased production by tested strains in comparison with general flocks.

Horticulture.—A demonstration commenced in 1956 in an isolated apple growing district (Yetholme, near Bathurst) has shown a method of eradicating Black Spot of pome fruit.

The method involved application of a single post-harvest spray of 0.1 per cent. phenyl mercuric chloride, taking the place of a programme of sprayings otherwise needed throughout the growing season.

The Yetholme demonstration area involved 170 acres of apple and pear orchards recorded as the worst district in New South Wales for occurrence of Black Spot. The demonstration has been outstandingly successful. It has shown that eradication of Black Spot can be attained with the single autumn spray.

This Black Spot eradication demonstration has received attention and acclaim throughout Australia and overseas; field days have been held; numerous press and radio interviews and statements given; progress has been reported in the *Agricultural Gazette of New South Wales*, followed by requests from England, Germany, Canada, U.S.A., South Africa and New Zealand for reprints of the published articles.

Other horticultural demonstrations have been concerned mainly with maintenance of fertility in orchards, use of survey equipment for planting on contour and of grading machinery in land preparation for irrigable orchards.

COMMONWEALTH DAIRY INDUSTRY EXTENSION GRANT

The Commonwealth has approved continuation of this grant to 30th June, 1963. It comprises £250,000 annually to the States to be used in extension services in the dairying industry. Of this amount the allocation to New South Wales is £64,880 per annum.

Type of Project

Projects conducted include demonstrations on pastures and fodder conservation; employment of field assistants to district dairy officers in conducting and reporting on field demonstrations on farms and promoting field days and meetings; surveys into milking machine efficiency; surveys into sterility in dairy cattle; recording of dairy cows' production performances to show the value of this in herd improvement; supply of extension equipment aids; and appointment of trainees and cadets to the universities and agricultural colleges.

Pasture and Fodder Conservation Demonstrations.—Most of the dairy farm demonstrations deal with sowing and maintenance of improved pasture, and conservation of pasture and other green material in clamp or pit silos.

A total of 132 of these types of demonstrations was established during the past financial year. They included 20 silage conservation demonstrations. As one result of these, clamp silos of either wood or concrete construction were first introduced into some of the major dairying districts.

Survey of Milking Machine Efficiency.—Over the past three years, officers have been surveying milking machines.

In the past year 606 visits were made to dairy farms for the purpose. In practically every case the machine was not working as efficiently as it should have been.

Many field days have been conducted to point out to farmers the need for regular and thorough examinations of their milking machines.

One outcome is that in some districts, companies have commenced to operate a service to examine machines and rectify faults.

Another result, following a meeting in co-operation with the N.S.W. Milk Board and the Dairy Research Foundation, University of Sydney, attended by representatives of manufacturing and distributing sections of industries handling milking machines, is a decision to establish a committee to set standards of performance for milking machines. For a start, a standard of performance for vacuum regulators will be established.

Survey of Infertility in Dairy Herds.—As a result of establishment of artificial breeding services to farmers, the importance of fertility of the cow has been brought into greater prominence. A Veterinary Officer of the N.S.W. Department of Agriculture is operating from Graham Park Artificial Breeding Centre at Berry, and Grant funds have been used to provide him with certain equipment and a laboratory technician; to speed up an infertility survey.

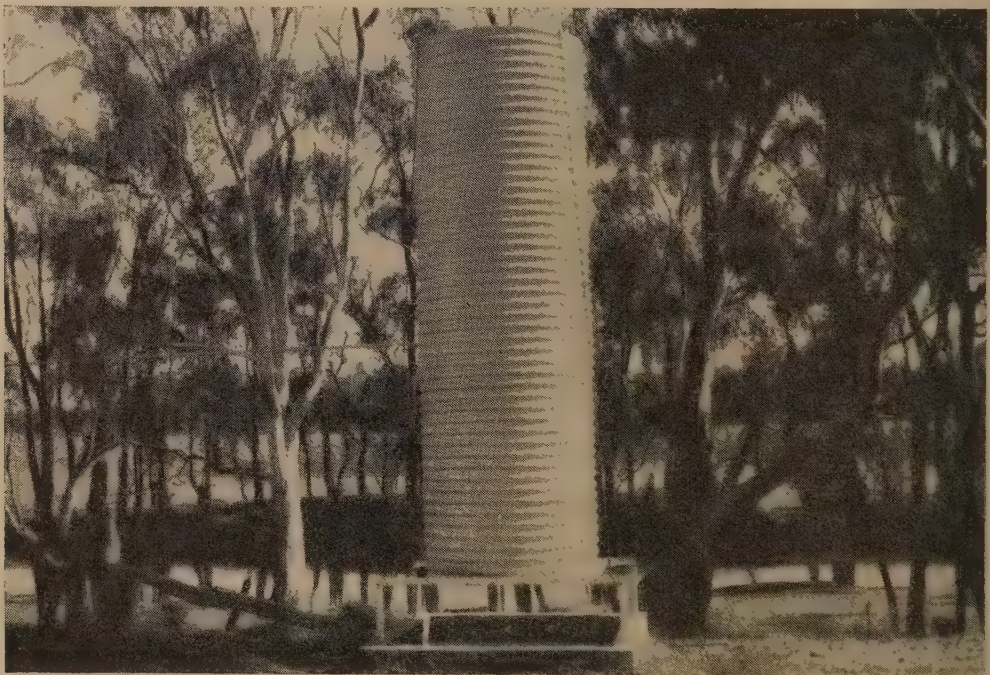
Herd Recording.—During the year sixty-four Herd Recorders tested and recorded approximately 45,000 cows under the Group Recording scheme. It is anticipated there will be an extension to seventy units during 1959-60.

Farm Water Projects.—Varied projects deal with farm water; e.g., prevention of loss of water from earth dams, water heating by use of solar heat, and means of water cooling for holding cream.

Dam Sealing for Water Conservation.—Red volcanic soils on the far north coast do not satisfactorily hold water in earth dams.

Following discussions with officers of the W.C. & I.C. and the University of N.S.W., it was decided to demonstrate as a dam sealer a substance known as Bentonite, an expanding colloidal clay.

A dam of 500,000 gallons capacity was excavated on a dairy farm, and sealed by mixing Bentonite in the top four inches of soil, at the rate of 1 lb. per square foot of the dam surface.



"Water Cooling Tower for Cream Cooling"

A demonstration water cooling tower has been installed on several dairy farms, in the course of a Dairy Industry Extension Grant project. Cream graders and dairy produce factories have been impressed by the cooling towers' effect. Dairy farmers are assessing the installations with special interest.

(Photo—Dairy Office, Deniliquin)

Heavy rains caused some washing, and maintenance repair work is needed to complete the job, but rate of seepage was slowed down from $4\frac{1}{2}$ in. to less than 1 in. per day.

Solar Water Heating Demonstrations.—Two demonstrations for the use of solar heat to bring water up to 140°F. , for dairy use, have created considerable interest in north coast districts. This work was carried out in co-operation with C.S.I.R.O.

The units have been fitted with electric boosters, the solar heat being insufficient to raise the water temperature to the necessary level.

Cooling Water for Cream Cooling.—Three "in the tank" cream cooling demonstrations on the north coast demonstrated that this method is unsuitable for use on dairy farms in New South Wales.

Four demonstrations to show value of the "tower" method of cooling water for cooling cream have been established in the Deniliquin district. These will not have operated throughout a full summer until the summer of 1959-60; but one of the towers commenced supplying cool water on 1st September, 1959, and the results since then have been most promising.

The property owner stated recently—"We usually had one or two cans of cream degraded each week, but since using the cooler only one can in all has been degraded." Tests of cream temperature showed that it was quickly reduced from 92°F. to 70°F. and that no fermentation occurred.

The Manager of Koondrook Dairy Company, to which the cream is forwarded has stated—"The cooler has definitely improved the quality of the supplier's cream, and we would like to see more installed in the district."

The Cream Grader at Koondrook Factory has stated—"The cream has been outstanding since the farmer started using the tower cooler. It is always cold, and feed taints and fermentation are removed. It is a pleasure to grade. If more coolers were installed it would make my work much easier."

Course	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
Agriculture	180	161	164	168	196	190	200	198	182	187	187
Horticulture	6	6	6	6	..	..	..	..	..	..	..
Dairy Technology	26	17	13	14	17	16	15	24	34	33	33
Food Technology	..	..	7	13	11	10	9	12	17	16	17
Totals	212	184	190	201	224	216	224	234	233	236	237

The current total, 237, is a record. It is limited by the accommodation available.

The number admitted to 1st Year of the Dairy Technology Course was twenty, the present fixed limit. Of these, ten were admitted under the Dairy Industry Apprenticeship Scholarship Scheme; making a total of seventeen under this Scheme, compared with ten in 1958.

The number admitted to 1st Year of the Food Technology Course was eleven; a record for this course, and one short of the fixed maximum for any one year. The total enrolment in the Food Technology course is now seventeen; one more than in 1958. Of the seventeen students, six are sponsored by food processing companies.

In all three courses, not all applicants could be admitted. The waiting period for applicants for the Agriculture Diploma Course still remains at approximately three years.

The number of farmers' sons entering the Agriculture Diploma Course this year was twenty-seven; as against twelve in 1958 and seventeen in 1957.

The number of students admitted from Agricultural High Schools was twelve; two less than in 1958, but equal to the average for the past eighteen years.

The educational standard of entrants this year was as follows:—

	To High School Leaving Certificate (5 years)	To Leaving Certificate, Failed	To High School 4th Year	To High School Intermediate Certificate (3 years)
	per cent.	per cent.	per cent.	per cent.
Agriculture I	45	11	16	28
Dairy Technology I	20	5	..	75
Food Technology I	64	9	9	18

Dairy Topics Journal.—An Editing Assistant is employed under this Grant. Six issues of the bi-monthly booklet *Dairy Topics* were produced. It is mailed direct to each dairy farmer. For each issue, 18,100 copies were printed. Issues during the past twelve months contained articles on herd recording, fodder conservation, feeding for production, diseases of dairy stock, milking machines, cream and butter quality, and numerous farmer achievement stories.

Photographic Aids Service.—Of 13,410 coloured and black and white 35-mm. transparencies returned to officers for extension use, some 25 per cent. were directly concerned with dairying. Many have become block-copy for illustrations in *Agricultural Gazette of New South Wales*, *Dairy Topics*, and booklets published by the Department.

The scenario and shooting script for a 16-mm. film "T.B. in Cattle" have been prepared by Division of Information Services in collaboration with Division of Animal Industry, and locations have been organised for filming in 1959-60.

Radio in Dairy Industry Extension Service.—Figures supplied by Regional Supervisors give an impressive indication of the increasing role of farm broadcasts in extension services in dairying districts. Statistics from five Regions where dairying is one of the leading industries reveal that 500 of the 1,300 broadcasts made during the past twelve months dealt specifically with matter for dairy farmers—livestock husbandry, feeds and feeding, veterinary and agronomy topics.

Tape recorders purchased with Grant funds have been used by Publicity Officers to secure success stories from dairy farmers, and for interviews with extension officers affecting the dairying industry.

HAWKESBURY AGRICULTURAL COLLEGE

Student Enrolment Analyses.—Following are statistics of student enrolment for the various diploma courses from 1949 to 1959:—

In the Agricultural Course, 72 per cent. of the entrants had completed 4th or 5th Year at High Schools. In the Food Technology Course 82 per cent. had done so.

In the Dairy Technology Course ten of the 20 entrants were apprentices; and nine of these have the Intermediate Certificate, which is usual, whilst only one has the Leaving Certificate.

Diploma Examinations.—Eighty-one students successfully completed the diploma examinations; fifty-six in Agriculture, sixteen in Dairy Technology, and nine in Food Technology.

Two of the Diplomas awarded in Agriculture were of Honours standard, including one Class I. Honours were also gained by three students in Dairy Technology, one being Class I. One student obtained Honours, Class II, in Food Technology.

Employment Pattern—Year 1958 Diplomates in Agriculture—

1. Farm and grazing properties	21
2. (a) State Dept. Agriculture	7
(b) Other Government Agencies	3
.....	10
3. Private firms—as technical representatives ..	16
4. Private firms—associated with agricultural products	5
5. Miscellaneous—	
Teaching	1
Agricultural Journalism	1
Rural Broadcasting	1
University Studies	1
.....	4

University Students' Courses.—The College provided practical demonstrations in Farm Management and Machinery for students in the second year of the University of Sydney School of Agriculture.

Woolclassing Certificates.—College students continued to maintain a high standard in the Final Certificate examinations in Wool Classing conducted by the Sydney Technical College.

Review of Agriculture Diploma Course.—The committee set-up to review the Agriculture Diploma Course, including the curricula, demonstrations, tours, practical work, and relationship with schools conducting courses in Agriculture, and with the Universities, is still pursuing its work.

Practical Experience on Approved Properties.—This year's diplomates were the first to be required to obtain practical work on approved properties during the vacations. At present the required period is only four weeks, but it does help students to comprehend practical problems on farm management. More attention is being given to practical and economic management problems in the curricula of all courses.

Extra-curricular Activities.—The Students' Representative Council, the Sports Club, the Debating Society, the Camera Club, the Student Christian Movement, and the College branch of the Agricultural Bureau, all contributed to promotion of social life and welfare of the College.

Ten students enrolled in a Life Saving Club this year. Seven won the award of the Bronze Medallion, two the award of Merit; and one qualified for the Instructor's Certificate.

Construction of the Olympic Pool is well under way. Student volunteer labour has been a major contribution.

This year, arrangements were made for first-year students in all courses to attend First Aid classes conducted by the local branch of the St. John's Ambulance organisation.

All students will now be required to obtain a St. John's First Aid Certificate. Its importance in the home and on the farm, on the roads, at work or at play, does not need to be stressed.

Farmer Schools, Conferences, Field Days, etc.—Winter Schools for farmers were conducted in dairy farming, poultry farming, pig raising and tractor maintenance. In all, some 214 farmers attended these schools. Schools were also provided for Junior Farmers, in poultry farming and in vegetable growing, with 31 in attendance.

The Summer School in Apiculture was again held, with an attendance of 20.

A School for Dairy Factory Apprentices was held as required under the Dairy Factory Apprenticeship Scheme; attended by 36 apprentices.

A Rural Leadership School, organised by the Agricultural Bureau of N.S.W., was attended by 35 rural men.

The Agricultural Bureau of N.S.W. held its Annual State Congress at the State College in July, as usual, followed by the Rural Leadership School attended by 35 rural men from Bureau branches and Junior Farmer Clubs' senior sections.

Facilities of the College were made available for the holding of residential conferences of Departmental Agronomists; an Advanced Dairy School for Interstate Dairy Officers, Research Workers and Factory Managers; a Conference of Sheep and Wool Research Workers; and an Australia-wide Conference on Aerial Agriculture.

The Annual Poultry Field Day was held again, in May.

An inspection of trials and results in vegetable research was made by growers, seed merchants, departmental officers and other interested persons.

Visitors.—As usual, many visitors during the year included groups of school children from primary and secondary schools, farmers' organisations, agricultural scientists, Colombo Plan fellows, and other overseas visitors, and departmental officers from other States.

The Australian Dairy Produce Board and the Equalization Committee visited the College to inspect the work generally, but particularly the research and education affecting the dairy-industry.

College Library.—In 1958-59, 457 new books were added. They included a gift of 113 works of fiction by Mr. J. H. Bryant.

Extension Activities.—The College supplied technical information to farmers by answering enquiries arising from correspondence or personal visits, providing copy for press releases and radio broadcasts in the Rural Session of the Australian Broadcasting Commission.

Royal Agricultural Society's Show.—Students competed successfully in the judging competitions, and a large number served as "cattle attendants". Students also served as "sheep assistants" at the Sheep Show.

The 16 Friesian cattle exhibited by the College at the R.A.S. Show, 1959, obtained nine awards, including two 1st and two 2nd places. In the Arab Section, the mare "Thalia" was awarded 1st in the Arab Mares 4 years and over, and Champion Arab Mare.

In the Cheese Section, a 1st prize was obtained for Blue Vein cheese; and 3rd prizes for two Edam cheeses, and for Dried Skim Milk made by sprayed process—export standard.

Hawkesbury District Agricultural Show.—The 15 Friesians exhibited by the College gained 20 awards, including 2 championships, 2 reserve championships, 7 first places, 4 second places. Non-competitive exhibits of Arab horses and Poll Hereford cattle were also shown, for extension purposes.

Works and Improvements

Student Accommodation.—The Valder Block has been modernised by plastering the walls, putting in power points, sanding the floors, laying down linoleum, and re-furnishing.

Cattle Section.—A large shed, 80 ft. x 20 ft., purchased from the R.A.A.F., has been placed on the Beef Cattle Section to be used as office, store and feed room. New beef cattle yards have been constructed. Much work has gone into the design of these yards. Already they have proved of great interest to graziers, as well as to students.

The dairy cattle feeding stalls have been improved by renewing the floors in one half section. Re-location and renewal of fences is proceeding. The milking shed, bails and yards have been painted.

Sheep Section.—Facilities have been improved by completion of work on fences, and erection of a shed for breeding work and general purposes. Concrete approaches to spray dips and a foot bath have been constructed. Scales have been installed for weighing sheep used in research work.

Piggery Section.—Renovation has been completed. Some old breeding pens were replaced. In the new test shed the pens are designed to save time and labour in routine work, and to enable a variety of trials, including weaning, litter testing and feed trials. A Ruakura type of round farrowing house has been installed; also an efficient, compact set of drafting yards, with weighbridge and loading race.

Poultry Section.—A prefabricated steel shed has been erected to provide satisfactory accommodation for plant and machinery.

Water Supply for Stock.—Three small dams of approximately 500 cubic yards capacity each, were constructed; one in Yarramundi and two in Clarendon paddocks, to enable full utilisation of dry summer feed.

Increased Carrying Capacity for Sheep and Beef Cattle.—Equipment has been purchased and installed, to enable 45 acres of winter pasture to be irrigated from the large ring tank near the Blacktown road. These pastures, planted in autumn, are making good growth. They will be utilised for both beef cattle and sheep, experimentally in the initial stages; a great deal has to be learned about efficient use of pastures, using both cattle and sheep.

Work is in progress to increase further the water storage for irrigation; to ensure reasonable carrying capacity, for the numbers of sheep and beef cattle considered necessary to give reasonable instruction in management aspects of animal husbandry.

Fencing.—Renovation and redesign of fencing was continued. Some 308 chains of fences were erected.

Olympic Pool.—Some 75 per cent. of the main construction work has been completed. Special thanks are due to the Director and officers of the Public Works Department for their co-operation in providing plans; to Mr. W. A. Barr, College Engineer, for supervising the work; and to students whose voluntary work has contributed so much to the construction and the reduction in cost of the pool.

Kitchen and Dining Room.—Plans have been drawn up by Public Works Department for a modernised kitchen, both in lay-out and equipment. Some new equipment has been purchased. Next year, re-organisation of the kitchen and dining room will proceed vigorously.

Other Improvements.—The Visitors' Room has been improved by wall plastering and a new ceiling. Extensive cottage repairs and alterations are in progress at the Pig Section. An extensive painting programme has been carried out; including several of the cottages. Paling fences have been replaced at three cottages. Concrete posts have been made for renewal of fences along the Main Drive. Parts of the College road system have been re-sealed. New roads have been laid; into the Beef Cattle Section, and around the side of the large ring tank—to give accessibility to the pumping unit.

Sectional Operations at Hawkesbury

The various farm sections continued their normal work of production, instruction, demonstration and research.

COLLEGE FARM

The seasonal pattern was similar to that of 1957-58—favourable for cereal production, but insufficient rain for good growth of autumn sown pastures. Some 21.70 inches of summer rain produced heavy growth of quick maturing native summer species; giving abundant cattle feed, but not favouring sheep grazing. These rains benefited summer crop production. Establishment and growth of dry area pastures was only fair, with 9.42 inches of rain over the remaining eight months—the critical germinating and seeding periods of subterranean clover-ryegrass pastures.

The annual heavy falls do not occur in a set pattern. Extremely uneven distribution of rainfall indicates the need for storage of water at the College, for later irrigation and optimum growth of pastures.

A good cereal harvest, and 200 tons of silage and 200 tons of cereal hay were produced. At the River Farm 15 acres of lucerne yielded 50 tons of lucerne hay, while 1,200 bushels of maize grain and 200 tons of maize and saccaline silage were made. The silage total is now 400 tons. From the River Farm, 15 tons of potatoes, 85 bags of grain sorghum and 5 tons of pumpkins were also harvested.

FARM MECHANISATION

The worthwhile area for cereal production is at present limited to 800 acres. Clearing of new areas is under consideration, to maintain production and fertility, using a wider rotation.

Heavy late summer rains were adverse for soil preparation and sowing of cereals this autumn. To date 40 acres of barley and 100 acres of oats are established; 150 acres of oats and wheat have been sown dry, and 150 acres remain to be sown.

Irrigated pastures in the Richmond paddocks continued to supply nutritive feed to the dairy cattle; but two wet late summers in succession have rapidly depleted the legume content of sub-clover pastures. Considerable resowing must occur next autumn. Lucerne has been valuable on the limited areas of better soil, for grazing and for odd cuts of hay. All areas have been topdressed with 1 cwt. of superphosphate and 1 cwt. of gypsum per acre, the latter to counter the adverse effect of continued use of effluent water.

Oats and millet are used as grazing crops prior to sowing areas back to pasture. This season, 15 acres of early-sown oats have given good grazing. A further 15 acres have been seeded.

The whole of this area requires redesigning and replacement of fences, drainage, and land levelling, to increase production.

HORSE SECTION

The Arab Stud was increased by five foals in the 1958 season, including three fillies. Increased number will allow culling and improvement of the stud. The policy of accepting only Arab mares for service was commenced this season. Actually thirteen head were received on the College, nine being for free return-service.

Draught horse numbers have been reduced by seventeen, to twenty.

FARM MECHANISATION

Repossession, by some of the major machinery companies, of a wide range of on-loan machinery and three tractors seriously affected student instruction during the year. Purchase of plant and equipment, including two tractors, has partly overcome this difficulty. On-loan receipt of a Massey-Ferguson 65 tractor from Massey-Ferguson Aust. Ltd. has helped to make up the power deficiency.

Decline in machinery holdings was partly offset also by purchase of six implements, previously on-loan, from Massey-Ferguson Pty. Ltd. Recent purchase of a rotary type mower, and a post hole digger and borer, will assist the efficiency of farm operations.

ORCHARD SECTION

Investigations.—The small scale trial of strawberries, including a test of the Departmental selection "Bountiful" was unsatisfactory. It had to be abandoned because of nutritional disorders. The trouble has been corrected. A new plot has been established, with a local strain of the Richmond Red variety.

Observations in connection with blossoming, pollination and fruitfulness of a range of Persimmon varieties were recorded. Fruits and seeds were described as part of identification work.

Details have been recorded of some quality factors in Washington Navel oranges on various rootstocks. The data relate to size of oranges, juice content, acidity and total solids; of fruit from eight stock/scion combinations included in the citrus rootstock trial.

Rooted plants of White Shiraz grapes have been planted to provide a plot for trials of the effects of various weedicides in close proximity to grape vines.

Orchard Development and Reconstructions.—The annual planting of a number of stone fruit trees to provide sufficient trees of all ages for student instruction has been continued.

Renovation of the pear and older peach plantings by pruning and other cultural treatments has been undertaken, with satisfactory results to date.

Removal of the sod, and the other attention given to citrus trees comprising the arboretum, have had most beneficial effects in growth and vigour of the young citrus.

A fruit tree nursery has been established; peach, apricot, apple, and fig trees, and grape vines, are being propagated.

A quantity of trifoliata seed was obtained from parent trees grown for the purpose. Seedlings will be raised for the College nursery, and surplus quantities of seed will be sold to nurserymen.

A large number of seedlings of narrow leaf iron-bark (*Eucalyptus crebra*) were raised in tubes, for woodlot and windbreak purposes.

FOOD TECHNOLOGY SECTION

Much closer contact has been attained with industry by the technology lecturing staff, to the benefit of the College, and the Food Technology Diploma Course in particular.

Winter School on Canning Technology.—In conjunction with the Food Technology Association, this successful school for factory foremen was organised and conducted at the College. It was attended by nineteen representatives from industry, from five states of the Commonwealth.

Equipment.—To provide for some training in practical meat processing, various items of small equipment have been purchased. With proposed modifications in the 'bacon factory', this equipment will be used in the food technology instructional programme commencing September, 1959.

Increased contact between the College and private industry has resulted in the loan or donation of several small items of equipment.

The cannery is now 10 years old. This has been reflected in increased maintenance needs of equipment units.

Processing Operations.—Basic aim of the processing operations is instruction, not production, to familiarise students with a diversity of products, in their practical training. Over eighty different products were processed by the technology students this year.

Supplies of raw materials for processing were mainly from the College and other Departmental Experiment Farms.

All vegetables processed were grown on the College. Principal vegetables processed were asparagus, beans, carrots, cauliflower, cabbage, beetroot, peas, tomatoes, broccoli, sweet corn, onions and gherkins.

Production of processed vegetables climbed steadily to over 25,500 lb., including 21,000 lb. canned vegetables and 4,500 lb. quick-frozen vegetables.

Vegetable products included 1,300 pints of tomato sauce, 200 cans of soup, 270 cans of mustard pickles, and some 550 cans of spaghetti.

Fruits processed were apricots, apples, grapefruit, grapes, peaches, pears, cherries, plums, pineapple, prunes, oranges and lemons. All citrus fruit was supplied by the College orchard. Other fruit supplies were obtained from Yanco Experiment Farm, Griffith Viticultural Nursery and Bathurst Experiment Farm. A few items were purchased through Government Stores, for example, tropical fruits and cherries.

Total fruit products processed amounted to over 15,500 lb., canned fruit totalled over 7,500 lb., and fruit pulps totalled 8,000 lb.

The cannery supplied 8,000 lb. of jam, meeting all College requirements. All pulp for the jam was processed at the cannery.

Vacuum-packed, quick-frozen poultry numbered 1,890 birds.

A range of other products was processed in small amounts for student instruction.

SCHOOL OF DAIRY TECHNOLOGY

The School operated at a high standard throughout the year. Increasing intake of milk and cream allowed all students to receive consistently practical training.

Staff.—Mr. E. H. Headley passed away on the 24th February, 1959, after a long illness. As Officer-in-Charge of the new School of Dairy Technology since its inception, he has left a record of outstanding service to the College and the dairying industry.

In April, 1959, Mr. D. W. Crowfoot, previously Regional Supervisor of Agriculture, Mid-Coast and Hunter Region, commenced duty as Principal Dairy Officer, School of Dairy Technology.

Mr. G. Smith, Dairy Research Officer, is in his second year of studies at Davis, University of California.

Staff at the School of Dairy Technology is adequate but the full production programme has involved officers in appreciable duties outside normal working hours.

Factory Plant, Equipment and Operation.—The School of Dairy Technology has operated in the new building for approximately four years. Most of the equipment was new on installation, and maintenance costs have been low. However, the need for replacements, and carrying of spare parts, are now obvious. Costs of maintenance will show an upward trend.

Plant, generally, is in good condition.

The old wooden churn has reached a condition which makes necessary its replacement by a new all metal churn.

The ice cream freezer churn was damaged in February, 1959. A loss of five month's practical training in ice cream manufacture has occurred in consequence. The disadvantage of installing equipment for which spare parts, not being carried, have to be obtained overseas or made locally, is obvious.

The milk bottling plant is working under commercial conditions and has been giving good service, but minor stoppages and breakdowns are becoming frequent, indicating deterioration. Preparation is being made for replacement of all necessary parts, to maintain efficient operation.

Cheese equipment has been maintained at a high level. Most of the cheddar cheese equipment is owned by the Hawkesbury Dairy & Ice Co., Windsor. That Company has requested the College to purchase the equipment, and negotiations are proceeding.

The Colonial-type boiler has been worked almost every day since the School of Dairy Technology commenced operations. Supply of another would allow greater reliability, and operation of both spray and roller dried milk plants at the same time, whilst leaving a reserve for future expansion.

Teaching equipment must be kept abreast of world developments in the dairying industry. New equipment to allow this would include a casein plant, colonial-type boiler, milk pasteurising unit, and milk vats. An approach has been made for finance adequate for acquisition of this equipment.

Dairy Research.—In the absence of Dairy Research Officer, Mr. G. Smith, overseas, the work of the Research section has been confined to the milking machine side.

The Survey of Milking Machine Efficiency continues to occupy most of Research Officer, Mr. B. Calder's time. Analyses of the previous year's figures have been summarised (see this report, under "Division of Dairying") and are being prepared for publication. Data from several hundred more machines await analysis.

Appointment of a Senior Survey Officer to take over some of this work, awaits Public Service Board approval. During the year one Survey Officer resigned, and another was trained to fill his place.

Reports indicate that the Milking Machine Efficiency Survey, being made by the Department with the aid of funds from the Commonwealth Dairy Industry Extension Grant, is one of the most popular and valuable single contributions to increased efficiency of dairy industry production.

During the year three machinery firm employees were trained at the College in the Milking Machine Efficiency field, as were a replacement Survey Officer and a factory employee. They became eligible for the provisional certificate of competency. A move has been made to have all Dairy Officers and some Herd Organisers trained and issued with certificates; so that they may advise farmers on their milking machine problems. This will greatly expand the extension effectiveness of the Division of Dairying.

Two refresher courses have been held. At these, ten Dairy Officers and two Herd Organisers received instruction.

One of the results will be that farmers should gradually become aware of the importance of service men being fully trained to use proper testing equipment, and will demand this of the machinery firms.

Dairy Research Officers have not yet been able to provide assistance to the manufacturing side of the industry, as was originally intended in their appointment.

Production.—The year has been marked by a steady intake of milk and cream at record levels at the School of Dairy Technology. This has enabled full use to be made of manufacturing facilities. It is estimated an increased intake of 33 1/3rd per cent. could be handled with the present equipment, provided the work is extended over a longer daily period.

Main sources of supply are Hawkesbury Dairy & Ice Co., Windsor, Nepean Co-op Dairy & Refrigerating Society, Penrith, and the Dairy Farmers Co-op Milk Co., Sydney. The handling of this year's supply indicated that all surplus milk supplies in the Hawkesbury District can be processed at the School of Dairy Technology.

Slow disposal of the College 40 lb. cheeses on the open market has caused concern. It is hoped that an outlet will be obtained by sales through Government Stores Department.

The College does not trade in sweetened condensed milk. Inadequate instruction is being given, in consequence. It is hoped to arrange sales in quantity to Government Stores Department, to allow expansion in this field.

A big local demand exists for the College skim milk powder. All stocks are cleared as soon as manufactured.

POULTRY SECTION

Breeding.—Flock improvement work is being continued with White Leghorns and Australorps, in conformity with the Poultry Improvement Plan (eggs). Results to date indicate a satisfactory increase in egg production.

Forty, day-old White Leghorn pullets, and forty, day-old Australorp pullets were submitted for testing under the Accredited Poultry Breeders Random Sample Test.

Egg Laying Competition.—The Fifty-seventh Egg Laying Competition ended on 23rd March, 1959. A full report has since been published. The fifty-eighth competition commenced on 1st April, 1959.

Random Sample Test.—The Sixth Random Sample Test ended in December, 1958, 500 days from the actual hatching date of each sample. The Seventh Random Sample Test commenced in August, 1958. It will be conducted for a period of 500 days.

Accredited Breeders Random Sample Test.—The First Accredited Breeders Random Sample Test ended in January, 1959, 500 days from the actual hatching date of each sample. A final report was circulated to all breeders and to the Poultry press. The second test commenced in August, 1958. It comprises twenty samples from seventeen breeders.

The entries comprise ten groups of White Leghorns, eight groups of Australorps, one group of Langshans and one group of Rhode Island Reds. A report on this test, to 24 weeks of age, was circulated to all breeders and to the Poultry press.

SHEEP AND WOOL SECTION

Breeding and Management.—It was necessary to hand feed on a limited scale only. Grazing oats again provided green feed under varying seasonal conditions, and carried the ewes and lambs through to marking time. Dry-sown improved pastures, though limited in area, and patchy, have proven over a period of three years their capability of carrying high stock numbers. They are significantly providing higher quality feed, whilst also building up soil fertility.

The 1958 lambing percentage for the Romney Marsh flock was 70 per cent. The crossbred ewes, used in experimental work for grazing comparisons, lambed very successfully, the percentage being 104 per cent. The College breeding flock, comprising crossbred and merino ewes, gave more trouble than usual; only a 70 per cent. lambing.

It was possible to turn off only seventy-five lambs as suitable for market; because of adverse weather and the severe setback suffered by young stock early in 1959.

Diseases and Parasites.—The period from January to April, 1959, was the worst for many years at the College. Young sheep failed to respond to treatment, and more deaths than normal occurred. Pneumonia and constitutional weakness were brought on by constant wet conditions. Young sheep were predisposed to worm infestation, associated with scouring and other ill-effects.

Incidence of entero toxæmia was greater than in previous years, and a vaccination programme was inaugurated. Vaccination against tetanus was also carried out.

Jetting with dieldrin gave only about 60 per cent. efficiency under a very severe fly-wave. Diazinon was needed, to obtain effective control of the primary green blowfly.

Experimental Work.—Sheep are being used in an experiment to compare an irrigated pasture, comprising improved species, with a non-irrigated native pasture and grazing oats, for prime lamb production. Both pasture types are stocked at high rates.

Sheep on Hand.—At 30th June, 1959, there were 112 head of Romney Marsh (or stud); and 908 in the commercial flock, including sixty-five rams.

APIARY SECTION

General.—A favourable spring provided good breeding conditions, and colonies built up to productive strength by the end of October, 1958. Arrangements were made for thirty productive hives to be migrated in November to Bathurst Experiment Farm, and another ten hives in December.

Moving the bees to Bathurst proved very profitable, yielding 2,400 lb. of the College total honey production for the year (2,620 lb.), in addition to providing stores of honey for the bees' winter needs. The source was "Pattersons Curse", growing profusely in areas around Bathurst.

Sale of Queen Bees.—There has been a keen demand for queen bees, and 120 were supplied to apiarists. Most were bred from an imported American queen.

Bee Breeding Programme.—Progress has been made with the programme designed to produce hybrid bees. Several inbred lines have been established. These will be used for test-crossing next season.

PIGGERY SECTION

General.—The health and quality standards of the stock were maintained.

Boars were introduced from Grafton Experiment Farm, and from a private breeder, Messrs. Cowan Bros. of Casino.

Forty-one litters were farrowed. Stock numbers were reduced considerably through the year. Total monthly figures were held at 200 or below, and at 30th June, 1959, the total of stock on hand was 172.

The present breeding stock comprises six boars (one Tamworth, two Berkshires and three Large Whites), and twenty-two sows (four Tamworths, eight Berkshires, and ten Large Whites).

Sales of Stud Stock.—The demand for stud stock rose sharply during the latter half of the year. Supply was inadequate to meet the demand. Stud prices remained the same as in previous years. Thirty-two head of stud stock were sold and 109 other head were marketed.

Schools and Demonstrations.—Demonstrations were given to Sydney Technical College students, University of Sydney students, and Agricultural Bureau Congress delegates. Schools were held for Junior Farmers and Pig Raisers.

Demonstrations and Investigations.—Considerable work has been done on early weaning demonstrations, and on demonstrations dealing with Pig Testing.

CATTLE BREEDING AND MANAGEMENT SECTION

Dairy Cattle

Friesian Awards at Shows.—A Friesian team exhibited at the 1959 Royal Show, Sydney, gained two 1st, two 2nd and one 3rd prize.

For the third time in succession the Millmaster production prize was won, awarded for three females by one sire. The sire was again "Parkhouse Akrinjo 2nd", foundation sire of the College Friesian stud.

A team exhibited at Hawkesbury District Show gained twenty awards including two championships, two reserve championships, seven 1st places, and Reserve Supreme Champion Dairy Cow of the Show.

Stud Sales.—Fourteen Friesian bulls and twenty-eight females were sold. Of special interest was the sale by auction at the R.A.S. sales, of the young Friesian bull "Hawkesbury Comet Conqueror" for 130 guineas, and the Friesian cow "Hawkesbury Netherland Befrette 2nd" for 150 guineas.

There has been a marked increase in demand for all Friesian stock. No Friesian bull is available for sale at present. There is a waiting list for both male and female stock.

Canadian Bull Transferred to Artificial Insemination Centre.—Imported Canadian bull "Sniders Fond Hope King" has been transferred to the A.I. centre at Berry. There are nineteen females by this bull in the College herd. A preliminary survey in Canada has shown that eleven of his daughters as two-year-olds averaged 11,012.5 lb. milk, 339 lb. butterfat at a 3.6 per cent. test, at 2 years of age.

New Zealand Bull's Daughters.—"Glenhope Model Posch" (imp. N.Z.) has ten daughters in milk, showing promise. Two of them completed a lactation period as senior two-year-olds, with the following production.—

"H. Posch Destiny", 14,421 lb. milk, 454 lb. butterfat, 3.4 per cent. test.

"H. Model Lenora", 12,750 lb. milk, 519 lb. butterfat, 5.2 per cent. test.

"H. Posch Dixie", 11,340 lb. milk, 440 lb. butterfat, 4.0 per cent. test.



"Calf-holding Cradle at Hawkesbury"

Farmers visiting Hawkesbury Agricultural College have been specially interested in the recently completed cattle drafting yards and calf-handling equipment. College officers visited many properties in various parts of the State, to select ideas for incorporation in the plans for the new yards now impressing farmers.

(Photo—Agricultural Bureau)

Herd Average.—Thirty-six cows averaged 11,837 lb. milk and 432 lb. butterfat. Average butterfat yield was maintained at the same as last year. Milk yield average was 778 lb. lower, due to adverse seasonal conditions compared with last year.

Pasture Position.—Extensive work has been carried out in establishment of improved pastures, but shortage of winter feed remains a problem. Winter pastures comprising sub-clover and rye grass are backward and patchy, owing to the adverse season. Establishment of additional pasture paddocks was prevented by dry conditions, but oats and barley recently sown following good rain will supplement the feed supply.

Fencing of the dairy paddocks is progressing well; with calf paddocks and springer paddocks nearing completion.

Beef Cattle

Poll Hereford Stud.—This stud was founded at the College in 1956, with females from Pylara, Wootton, and Dananbilla for foundation stock. The stud now totals forty-four animals; twenty-two adult females, eleven heifers, nine young bulls and two older bulls. "Pylara Taurus" is at present top sire. Six heifers calves and eight bull calves by him have been born during 1958-59.

Only one sale was transacted during the year; an 18-months-old bull, "Hawkesbury Silvermode". It sold for 100 guineas. A high-class herd sire is badly needed for this stud.

RESEARCH AGRONOMY SECTION

Scope.—Altogether ninety-four experiments were in hand during the year, concerned with pastures, plant nutrition, weed control, plant breeding, field crops, and vegetables.

The area of College land used by Agronomists for crops and trials remains at 60 acres, 20 acres for vegetables, 20 for pasture trials and 20 for field crop and other trials.

The staff in this section now comprises six Agronomists, three field assistants and eight farm hands.

Plant Breeding.—Work continued with tomatoes, beans, peas and onions. The hybrid tomatoes released to commercial growers in 1957 are still giving good results. A new bean variety developed at the College and named "College Pride" was released for commercial production.

Weed Control Trials.—A very successful series was conducted, particularly with vegetable crops. As a result, further recommendations can be made for the use of new herbicides on several vegetable varieties. This work is continuing, and being extended to other districts.

Plant Nutrition Work.—A large number of soils from various parts of N.S.W. were tested, in routine fertiliser trials, in the glasshouses.

In addition to the routine work, several important aspects of plant nutrition have received detailed attention in the glass-house trials. This research work, particularly in respect of nutrition of pasture plants, is being continued. The results will be applicable to many areas in N.S.W.

Field Work on Pastures.—Continued intensive research with nitrogenous fertilisers has enabled general recommendations to be made for the use of these fertilisers on pastures in the Hawkesbury district. Investigations into the usefulness of various plant species for improved pastures in this area are also well advanced.

A large scale grazing trial was commenced during the year, to investigate pasture management practices in relation to fat lamb production.

Other aspects of pasture work are also receiving attention, so that pasture recommendations for this area are under constant College notice.

Field Crop Research Programme.—This, particularly in respect of maize, sorghum, and other fodder crops, was intensified. It is yielding valuable information and will continue.

Technical Reports.—The Technical Reports of the Research Agronomy Section of the College have been submitted to Division of Plant Industry and their contents are incorporated in that Division's section of this report to the Department of Agriculture.

WAGGA AGRICULTURAL COLLEGE AND EXPERIMENT STATION

Student Enrolment.—The peak enrolment of ninety-four established in February, 1958, was maintained in February, 1959. It was possible to admit all eligible applicants who

had applied approximately three years ahead. A continuing increase in application rate has increased the length of the waiting list. The quota for each year is exceeded up to 1963 inclusive.

Comparisons of student numbers each year for the past five years are tabulated:—

Enrolled Students

	1955	1956	1957	1958	1959
Third Year	18	21	21	25	29
Second Year	22	22	28	32	31
First Year	23	30	30	37	34
Totals	63	73	79	94	94

Over the same period, the numbers and percentages of assisted students have risen as shown:—

	1955	1956	1957	1958	1959
Bursars	5	6	6	6	6
Scholars	4	5	9	13	14
Cadets	5	10	8	9	9
Others (Repatriation, Legacy) ..	..	..	3	1	3
Totals	14	21	26	29	32
Percentage of above totals, to All Students	22.2	28.4	32.9	30.9	34.0

Of the total admissions in 1959, 37 per cent. had only the minimum qualifications. Five per cent. had at least one year's extra schooling. Most of the rest (58 per cent.) had passed the Leaving Certificate examination.

Diploma Examinations.—All twenty-four students successfully completed the Agriculture course at the 1958 final examinations. One graduated with Honours.

Ex-student Vocational Statistics.—At June 30, 1959, there were 225 ex-students. Their vocational activities are classified below:—

1. Following agriculture—	
(a) On farms	124
(b) With Government Departments, Commissions or Boards—	
Agriculture	24
Soil Conservation	9
Education	3
A.B.C.	2
Rural Bank	2
Valuer-General	1
Milk Board	1
(c) Undergoing University training	42
(d) In commercial firms	19
Total following agriculture	188
2. Left agriculture	11
3. Occupations unknown	26
Total	225

Assuming that a few in the "occupations unknown" category are following agricultural pursuits, approximately 90 per cent. are so doing.

Student's Tours.—Three regular educational tours were undertaken, each of approximately one week's duration, to the Southern Tablelands, A.C.T. and Illawarra in October, 1958; to Gundagai-Tumut-Batlow-Tumbarumba in November, 1958; and to the Murrumbidgee Irrigation Areas in February, 1959.

Various half- or one-day tours were conducted, to the Soil Conservation Research Station, the local abattoir, saleyards, bacon and dairy factories, and several sheep and cattle stud properties in the district.

Students gained valuable experience as stock attendants and/or competitors in stock and produce judging competitions at the R.A.S. Show, Murrumbidgee P. & A.A. Show, Sydney Sheep Show, and Wagga Ram Show and Sales, and in visits to wool stores and woollen mills.

Curriculum, External Aid.—Expert instruction was received from outside sources for two days each for the third year class, in shearing, the use of explosives in agriculture, farm welding and farm machinery and tractors.

The College continued to depend also on the following outside sources of instruction: Wagga Wagga Technical College for Business Principles, Bookkeeping, Mechanics, Farm

Engineering, Woodwork, Metalwork and Woolclassing; the Division of Marketing and Agricultural Economics for instruction in Economics and Farm Management; the Division of Information Services for instruction in leadership training and extension methods; the Southern Regional Supervisor's staff for instruction in Apiculture and Poultry Raising.

Winter Schools.—The following schools were held during the College Winter vacation—the Eighth Junior Farmers' School in Wheat and Sheep Husbandry (attendance nineteen), the Eighth Turkey Raisers' Convention and School (attendance fifty), a third group of second-year Agricultural Science students from Sydney University, for a fortnight's tuition in Farm Machinery and practical Animal Husbandry (attendance fifty-five).

Extra-Curricular Activities.—Customary regular annual competitive sports were engaged in by students. The College oval, a decided acquisition, was used for the first time for football and athletics.

The fifth annual First Aid class and examinations were conducted by the Wagga District Ambulance Station staff.

Annual inter-year debating competitions and public speaking contests were held intra-murally.

Diploma Day.—Diploma Day in 1959 was held earlier than usual, to coincide with the tenth anniversary of the foundation of the College. It was attended by approximately 500. The Minister for Agriculture presented the Diplomas and prizes.

Bushfire Control.—Quite a few bushfire outbreaks were handled by various members of the College staff rostered to operate the Base Station for the Mitchell Shire and this unit is providing an outstanding service in preventing fires from reaching too great proportions.

Official Opening of the Graham Block.—The Official Opening was performed by the Hon. J. J. Cahill, M.L.A., Premier of New South Wales, on 19th September, 1958. Approximately 500 people attended.

Works and Improvements.—Tenders are being called for a few minor alterations and additions to the Graham Block, and several new buildings.

Erection of a new dairy building and yards was completed late in 1958. Good progress was made on arrears of painting and general maintenance of cottages, quarters and farm buildings. One further new cottage was completed. Demolition of all unwanted pre-war buildings has been completed.

Re-landscaping of the main quarters surrounds has made considerable progress. A tennis court was established for the use of the staff and a start made on two further tennis courts, for students, and a new basketball area.

In connection with a proposed research project in the efficient making and utilisation of pasture silage, an animal shed has been built, to house sheep, and materials have been secured for the necessary experimental silos. A new office unit has been erected for the Livestock Officer (Sheep and Wool). Provisional plans have been drawn for a new stud horse section. A new cage shed was erected to house 530 hens at the poultry section, and twin bird laying cages, and further rearing cages to house 300 young birds, have been received and installed. A further vehicle- and tractor-shed with five bays was erected on the Farm section. Work has commenced on a new, handyman's shop.

Long-wanted electricity extensions have been made, principally to the Piggery section and the farm shops area. Water supply has been extended to the beef cattle section, to the Coolamon Road entrance, and to a number of paddocks.

Sectional Operations at Wagga

College Farm.—The grain harvest was the largest produced on this station during the last forty-five years. It could well be the largest ever. Records for years prior to 1912 are not available. Average yield of 28.2 bushels per acre is the highest since the abnormally good season of 1932.

Wheat from 277 acres yielded 7,644 bushels, oats from 261 acres yielded 7311 bushels, and 19 acres sown to barley produced 757 bushels. Total grain harvest from 557 acres was 15,712 bushels.

Haymaking produced 104 tons of cereal, 9,900 bales of lucerne and 200 bales of pasture hay. Cereal crops on 46 acres were grazed, and silage operations resulted in 140 tons of fodder.

An additional 26 acres of lucerne was sown, bringing the total to 220 acres. Sown pastures exceeded last year's by 68 acres, bringing the total to 710 acres.

Old fencing was replaced by 156 chains of new fencing and 48 chains of new subdivision fencing was erected.

Certain machinery firms commenced to implement the policy of withdrawing equipment previously on consignment to the College. As a result, most of the Plant Vote had to be expended on major replacement items. These included a hay baler, mower, side-delivery rake, header, land packer and forty horse power tractor.

Agronomy Section.—Three experiments respectively entered a second or third year of operation. These were:—

- (i) The *Lucerne Establishment and First Year Management Trials* comparing lime-pelleted with plain seed, and checking on the use of molybdenum and *Rhizobium*.
- (ii) The *Lucerne Renovation and Topdressing Trial* comparing different implements for renovation, and different rates of application of superphosphate.
- (iii) A *Soil Tillage Trial*, in co-operation with the University of N.S.W., comparing the differential effects on soil structure and crop yields, of different primary and secondary tillage implements and operations.

The Agronomy Section made further progress with a general tree planting programme; two pasture projects (species and establishment methods) for student instruction; also supervised growth, roguing, harvesting and grading of pure seed from an area of approximately 70 acres of wheat, oats and barley, and assisted the selection of Foundation Seed barley.

Orchard Section.—The orchard boundary fencing on both sides of the College drive was practically completed and a previously steep and dangerous entrance and gateway relocated.

The season was a classic example of how adequate moisture in the spring can set going a potentially fine series of crops, only to be spoiled by lack of a few inches at critical periods during the summer. The dry summer reduced all crops by approximately half their yield.

Crop disposals were as follows:—The College used one ton of fresh stone fruits and 350 bushels of apples; of 700 bushels of pears, 140 bushels were undersized and used for stock feed; some of the remainder was canned for College use and the bulk was marketed; some 3,600 lb. of prunes were dried; excess over College needs was disposed of commercially; about 4 tons of olives were sold for oil manufacture, and 60 half bushel cases of pickling olives were marketed. The almond crop was light (700 lb.), but difficulty was experienced in disposing of it and the previous season's carry-over.

Apple stock trials, prune stock and scion trials and observations on plum, prune, apple, and pear varieties were continued.

Practical instruction to students was given in all phases of orchard management and in harvesting and processing. Prune packing, processing and irrigation demonstrations received more attention than in previous years. Successive plantings of trees over past seasons have provided an adequate range of demonstrational material for field work. The plantings are being continued for future instructional needs.

Dairy Section.—The new dairy building and yards were used for the first time, in November, 1958. General satisfaction is expressed with the facilities and improved hygiene.

Herd production remained at a high level. From forty cows under test an average of 430 lb. butter fat and 8,722 lb. milk were recorded per head. The top producing cow "Yanco Conqueror's Faithful" reached a twelve-month test in July, with 18,885 lb. of milk and 870 lb. of butter fat, equivalent to 1,061 lb. of commercial butter. Indicative of the herd's quality, it won seven of the eleven production prizes awarded by the N.S.W. Jersey Herd Society; including the prizes for the six highest producers in the State.

Natural increase from the herd was forty-four head. Twenty bulls sold for stud purposes brought approximately 1,050 guineas, and thirty females sold as studs or culls realised 720 guineas. Demand for the College stud animals far exceeds supply, and there is an unusually long waiting list.

It was necessary to agist thirty-five heifers at two other Experiment Farms for portion of the year, and seven good-type females were transferred to Grafton Experiment Farm to grade-up the Poll Jersey Herd.

The herd sire "The Mount's Orange Boy" (imp.) was transferred to Berry Artificial Insemination Station, exchanged for the bull "Austral Park Edinburgh".

At Wagga Show, champions of both sections were exhibited. Other prizes were gained, for the best type dairy cow, the best group of dairy cattle and seven first and three seconds in individual classes.

Animal Health.—An imported Poll Shorthorn bull was found to be suffering from Johnes disease and was slaughtered. As a result of the incidence, the beef cattle section has been quarantined until 9th October, 1959.

Milk Fever remains a problem in the dairy herd. Pink Eye caused some trouble through the summer and autumn. The Strain 19 vaccination programme was continued.

Salmonellosis is epizootic in the piggery. Occasional epizootics resulted in deaths among three to four month old pigs. Swine pneumonia, White Scours, and Large Round Worm infestation remained chronic problems.

Examination of all rams on the College returned completely negative results for Ovine Brucellosis. Infertility in the Dorset Horn Stud is a serious problem. Investigation is continuing.

Animal Husbandry Research.—Two research projects were instituted by the Lecturer in Animal Husbandry, each involving team work.

- (i) An *Investigation into the Palatability and Digestibility of Silage*, made at three different stages of growth and subjected to two different rates of compression. The material being ensiled will be subterranean clover-rye grass pasture. Some of the necessary buildings and equipment have been installed for this major project.
- (ii) An *Investigation into Interactions of Stocking Rates, Types of Stock and Pasture Management*, for which an area of approximately 30 acres has been subdivided.

Each of the above Projects lends itself to considerable and interesting development. Members of the College staff are also co-operating with the Animal Husbandry aspects of some pasture research investigations being conducted by a C.S.I.R.O. Officer located with the Agricultural Research Institute, Wagga.

Piggery Section.—Stud and market sales yielded £1,300. In addition, the College consumed 8,300 lb. of pork and seventy-two sides of bacon.

Provision of electricity has made it possible to instal heating lamps for farrowing. This will reduce mortality in piglets during the colder months.

A new loading race and drafting yards have been constructed. Progress has been made on the construction of a set of sow feeding stalls, and a Ruakura Round House style of farrowing shed. Considerable, temporary improvements have also been made to the College slaughtering premises.

Some of the older sows and boars are being culled and replaced with stock from Hawkesbury Agricultural College and Wollongbar Experiment Farm's herds.

College pigs were successfully exhibited in all possible classes at the Wagga Show.

Horse Section.—By policy the total horse population (57) is the lowest for many years.

Twelve horses were broken-in during the year and four were transferred to other Departmental Farms. Twelve Arab foals were born; ten sired by the imported stallion "Razaz". Some of the latter are of outstanding quality.

Teams from the Arab stud were shown at the 1958 Wagga and 1959 Sydney Shows. At Wagga, championship awards were gained in the stallion and the mare classes, and a first in the open mare class. At Sydney Show, the College exhibit was less successful than in former years. Second prizes were gained in the stallion and the mare class.

Twenty-two outside mares were sent to the two stallions in 1958. Current policy limits stud services to registered mares only (but includes Arabs, Part-Arabs, Anglo Arabs, Ponies and Thoroughbreds).

Beef Cattle Section.—At the end of the year the stud totalled seventy-three head. A strong team was exhibited at the 1958 Wagga Show. It secured the champion bull prize and three first and three second prizes. Quarantine prevented exhibition at the Sydney Royal Show but the imported bull which had to be destroyed is represented in the stud by twenty-seven of his progeny. The majority are of outstanding quality.

Quarantine also affected sales. Only one bull was sold to a local grazier for £100.

Sheep Section.—Only small changes occurred within the College flocks. Some aged cross-bred ewes have been replaced with young breeding stock.

A breeding trial to test the repeatability of the early mating characteristics of two breeds of sheep was commenced, and the Livestock Officer (Sheep and Wool) is now heavily committed in team research projects earlier mentioned under "Animal Husbandry Research".

Reference was made under "Animal Health" to the infertility problem in the Dorset Horn Stud. A new stud Dorset Horn ram was purchased from an Orange property.

Sheep exhibited in open competition at Wagga Show met with moderate success.

Poultry Section.—Stock numbers averaged 1,300 fowls and 175 turkeys. The extra shedding referred to under "Buildings and Improvements" has increased the carrying capacity of this Section, and maintained more than adequate egg production.

Quarantine has been lifted from the semi-intensive yards, thus increasing the laying-hen capacity of the Section.

A breeding improvement programme has been adopted for the Australorp flock. Production testing is completed for the first year, and breeding stock for the ensuing season have been selected.

Fewer turkeys were hatched this season. Plans are under consideration for an improved turkey demonstration unit.

Apiary Section.—The existing apiary has been bisected by a necessary new road and as a matter of urgency must be relocated. An area has been selected, and plans for the arrangement of the new building and apiary have been prepared.

The number of hives remained static. Despite the adverse season their condition is satisfactory. This is mainly due to a complete Queen rearing programme commenced in the early spring and completed during the summer. In this programme all hives were reconstructed, and imported Queens were introduced to the College.

E. O. TOUT, Under Secretary.

7th October, 1959.

APPENDIX I

The Accounts of the Department of Agriculture, 1958-59

The annual cost of maintaining the Department of Agriculture is met from the Consolidated Revenue Fund, whilst capital expenditure on buildings and permanent improvements to departmentally owned property is financed from the General Loan Account. In addition to these general classifications of expenditure, the Department is assisted in the financing of certain specified lines of research and development and the control of insect pests and animal diseases by direct levies on industry and by grants from the Commonwealth Government and public and private organisations. Operations of this nature are reflected in a large number of separate accounts within the general Treasury classification of "Special Deposits Account", some details of which are given elsewhere in this Appendix.

COMPARATIVE STATEMENT OF EXPENDITURE

Account	1957-58	1958-59	Increase or Decrease
	£ s. d.	£ s. d.	£ s. d.
Consolidated Revenue Fund	3,420,868 17 8	3,579,641 18 10	158,773 1 2
General Loan Account	75,455 18 4	71,097 1 10	(Increase) 4,358 16 6 (Decrease)
	£ 3,496,324 16 0	3,650,739 0 8	154,414 4 8 (Increase)

EXPENDITURE FROM CONSOLIDATED REVENUE FUND

The following tabulation shows a comparison of expenditure by the functional Divisions of the Department for the last two financial years :—

Division	1957-58	1958-59	Increase or Decrease
	£ s. d.	£ s. d.	£ s. d.
Central Administration.....	594,662 19 10	682,286 1 2	87,623 1 4 (Inc.)
Plant Industry	199,514 0 10	207,859 5 3	8,345 4 5 (Inc.)
Horticulture	175,484 17 6	181,790 11 2	6,305 13 8 (Inc.)
Dairying	184,251 13 1	179,330 14 0	4,920 19 1 (Dec.)
Hawkesbury Agricultural College	187,739 14 4	213,679 18 2	25,940 3 10 (Inc.)
Wagga Agricultural College.....	97,633 0 0	102,349 1 3	4,716 1 3 (Inc.)
Experiment Farms and Stations	343,857 13 10	355,481 4 5	11,623 10 7 (Inc.)
Animal Industry—			
Head and District Offices	399,621 18 4	446,301 19 11	46,680 1 7 (Inc.)
Queensland Border	55,361 14 3	57,277 2 3	1,915 8 0 (Inc.)
Tick Quarantine Areas	1,057,247 17 5	1,031,548 1 1	25,699 16 4 (Dec.)
Royal Botanic Gardens and Allied Activities	125,493 8 3	121,738 0 2	3,755 8 1 (Dec.)
Totals	£ 3,420,868 17 8	3,579,641 18 10	158,773 1 2 (Inc.)

This comparison has been affected to some extent by a slight change in budgetary policy, whereby expenditures on Rent and Workers' Compensation Insurance Premiums were brought together under Central Administration in 1958-59, whereas previously the expenditure was shown under each Division.

Upward trends in salaries and wages were still in evidence throughout the year and restrictions on travelling were eased slightly, resulting in an overall increase in expenditure.

A long spell of dry weather has made possible the long deferred re-conditioning of Public Watering Places in the Western Division of the State. An increase in expenditure amounting to £19,229 0s. 5d. on this project is reflected in the total increase of £87,623 1s. 4d. under Central Administration.

Considerable progress was made with the maintenance of buildings and properties which, through lack of finance in prior years, had shown some retrogression. As a consequence the expenditure shown against Hawkesbury Agricultural College and Experiment Farms and Stations has exhibited a fairly sharp increase.

Vacancies on the Departmental establishment for Veterinary Officers, Livestock Officers and Meat Inspectors, which existed throughout 1957-58, were filled during 1958-59 and, as a consequence, the expenditure shown against the Division of Animal Industry (Head and District Offices) has reflected this trend.

Notable among the decreases is the reduction of expenditure in the Tick Quarantine Areas. This reduction was occasioned by the partial failure of the eradication campaign and consequential revision of the whole pattern of this Department's work in this field.

EXPENDITURE FROM GENERAL LOAN ACCOUNT

Expenditure from General Loan Account for the year was £71,097 1s. 10d., of which £10,172 19s. 0d. was spent at Hawkesbury Agricultural College; £6,085 12s. 10d. at Wagga Agricultural College and Experiment Station; £53,688 10s. 0d. at Experiment Farms and Stations; and £1,150 0s. 0d. on the Queensland Border.

An amount of £36 13s. 5d. was received from Pastures Protection Boards as instalments on rabbit destruction equipment supplied to them, the cost of which was met from General Loan Account. Unissuable Repayments to the General Loan Account Vote "Promotion of Agriculture" totalled £550.

SPECIAL DEPOSITS ACCOUNT

The following statement gives a complete list of all accounts and funds within the Special Deposits Account at the Treasury on which this Department operates:—

Name of Account	Balance as at 1st July, 1958	Receipts 1958-59	Payments 1958-59	Balance as at 30th June, 1959
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Advances to Officers for Purchase of Motor Cars	Dr. 97,925 9 7	34,939 10 4	54,420 3 8	Dr. 117,406 2 11
Contribution towards Running Expenses of Tractor Mower at Centennial Park	358 7 0	122 13 4	154 0 11	326 19 5
Potato Growers' Licensing Act, 1940	590 1 5	1,747 3 0	1,546 9 8	790 14 9
Balance of Salaries Adjustment Suspense Account . .	57,528 0 4	73,537 14 9	57,528 0 4	73,537 14 9
Government Printing Office—Working Account and Stores Account and Sale of Publications	593 7 11	13 9 7		579 18 4
Noxious Insects Destruction Account	57,731 10 9	746 9 2	12,612 3 7	45,865 16 4
Swine Compensation Fund	92,372 1 2	29,606 10 8	20,527 15 0	101,450 16 10
Hawkesbury Agricultural College Canning Factory Account	475 6 5	1,582 7 4	1,244 16 6	812 17 3
Hawkesbury Agricultural College—Dairying Factory Working Account	17,397 15 4	155,478 4 6	155,146 11 7	17,729 8 3
Tobacco Industry Trust Account	10,509 1 7	8,501 13 6	7,569 7 11	11,441 7 2
Commonwealth-State Bush Fire Relief Scheme	12,710 8 7		4,838 11 2	7,871 17 5
Pasture Control Account		10,000 0 0		10,000 0 0
Unclaimed Moneys Account	1,052 2 11	229 7 5	78 5 2	1,203 5 2
Commonwealth Grant Towards the Promotion of Improved Practices in the Dairying Industry	6,864 1 6	73,269 16 6	64,390 7 11	15,743 10 1
Argentine Ant Eradication Campaign	890 16 10	16,446 1 9	17,187 5 2	149 13 5
Commonwealth Grant—Expansion of Agricultural Advisory Services—New South Wales	12,613 11 11	69,697 1 1	63,745 14 0	18,564 19 0
Cattle Compensation Fund	62,998 8 7	406,481 1 10	309,880 7 7	159,599 2 10
Flood Relief Scheme, 1955	6,498 10 5	150 0 0	1,306 3 5	5,342 7 0
V. P. Bragg Scholarship—Wagga Agricultural College .	97 12 1	294 12 7	310 0 0	82 4 8
V. P. Bragg Scholarship Account (Investment)	6,000 0 0			6,000 0 0
Dingo Destruction—Central Tablelands and Hunter Dr. 50 0 0		50 0 0		
Banana Growers' Plebiscite, 1958		189 17 2	189 17 2	
Egg Marketing Board Triennial Elections		576 19 4	576 19 4	
Navy Bean Marketing Board—Triennial Election, 1958 Dr. 5 1 9		13 12 8	8 10 11	
Rice Marketing Board of New South Wales—Triennial Elections		44 13 9	44 13 9	
Argentine Ant Eradication Campaign	Dr. 2,914 0 0			Dr. 2,914 0 0
Water Supply—Shannon Vale Nutrition Station			1,184 12 4	Dr. 1,184 12 4
Hawkesbury Agricultural College Trust Account	4,677 3 8	7,111 2 3	5,921 4 8	5,867 1 3
Wagga Agricultural College Trust Account	1,929 14 11	1,914 6 3	1,779 2 10	2,064 18 4
Advertising—Department of Agriculture Publications Account	1,515 16 0	10,908 12 6	10,112 17 4	2,311 11 2
Bequest from Estate of Emanuel Haropoulous for the purpose of Agricultural Research	15 5 9		15 5 9	
Trust Fund—Brown Rot Investigations	516 7 4	664 0 0	537 1 10	643 5 6
Commonwealth Bank (Rural Credits Development Fund) Grant towards Erection of Glasshouse, Hawkesbury Agricultural College	2 7 4		2 7 4	
Commonwealth Contribution for Research into Control of Insecticidal Resistance in Sheep Blowfly		750 0 0	408 16 5	341 3 7
Commonwealth Contribution for Research into Control of Itch Mite in Sheep		1,075 0 0	1,000 0 0	75 0 0
Commonwealth Contribution Towards Cost of Attendance of J. C. Keast at 16th International Veterinary Congress, Madrid, 1959		800 0 0		800 0 0
Contribution by Commonwealth Towards Cost of Investigations into Excess Spray Residue on Fruit .	2,527 13 9	2,300 0 0	2,245 13 6	2,582 0 3
Contribution by C.S.I.R.O. towards Fleece Testing work at Trangie	340 0 0			340 0 0
Contribution by Council of Advice to Pastures Protec- tion Boards towards cost of Attendance by Mr. E. McBarron at Grasslands Conference, New Zealand	10 7 9		10 7 9	
Contribution by Department of Commerce and Agri- culture towards Development of Auto-Stripper . .	850 0 0		850 0 0	
Contribution by Legume Inoculant Association towards Research and Service in the Field of Rhizobiology .	20 13 0			20 13 0
Contribution towards Animal Insect Pest Investiga- tions—Glenfield Veterinary Research Station	737 15 5		216 1 6	521 13 11
Contribution towards Cost of Overseas Trip—Dr. A. T. Pugsley	1,548 16 9		1,548 16 9	
Contributions by States towards Salary and Expenses of Patrol Officer, Grasshopper Control	3,912 8 8	2,053 10 0	1,788 12 1	4,177 6 7
Contributions for Plague Locust Trial Control Cam- paign	23,612 13 9	12,750 0 0	38 14 0	36,323 19 9
Contributions to Pasture Research Programme—Mid- Coast and Hunter Region		1,500 0 0		1,500 0 0
Contributions towards Cost of Miss A. Myers' Trip Abroad, 1956	71 9 5		71 9 5	
Contributions towards Establishment of Library at Agricultural Research Institute, Wagga	45 9 7		8 14 7	36 15 0
Cost of Attendance at World's Poultry Congress, 1958—V. H. Brann		1,350 0 0	1,350 0 0	
Department of Agriculture Honour Roll Account	43 16 0	165 18 6	209 14 6	
Department of Agriculture Suspense Account	1,378 3 4	48,685 16 2	48,656 9 4	1,407 10 2

Special Deposits Account—continued

Name of Account	Balance as at 1st July, 1958	Receipts 1958-59	Payments 1958-59	Balance as at 30th June, 1959
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Donation by I.C.I.A.N.Z. towards Pasture Fertilizer Nitrogen Investigations	1,078 5 8	1,500 0 0	1,621 15 11	956 9 9
Egg Marketing Board—Contribution for Investigations into Egg Quality .....	.....	2,000 0 0	46 0 0	1,954 0 0
Fire Damage Account	654 8 2	28 12 0	234 8 2	448 12 0
Hawkesbury Agricultural College Egg Laying Competition Prize Fund	570 2 11	425 7 2	247 9 1	748 1 0
Hawkesbury Agricultural College Swimming Pool ..	.....	13,306 16 7	2,087 17 6	11,218 19 1
Horse Breeding Fund	142 18 10	.....	.....	142 18 10
I.C.I.A.N.Z. Scholarship in Animal Husbandry, Wagga Agricultural College .....	.....	100 0 0	100 0 0	.....
McGarvie Smith Institute—Contribution to Nutritional Research Laboratory, Glenfield Veterinary Research Station	686 19 7	.....	147 5 7	539 14 0
Pastures Protection Boards of New South Wales—Subsidy to Glenfield Veterinary Research Station ..	712 15 4	2,969 5 4	2,982 0 8	700 0 0
W. S. Pender Memorial Fund—Interest on Bonds ..	212 7 9	41 5 0	.....	253 12 9
Rice Research Laboratory, Yanco	3,896 0 0	.....	3,610 0 0	286 0 0
Sale of Book "Farm Management and Elementary Agricultural Economics"	0 8 11	.....	.....	0 8 11
Sale of Photographic Prints	1 14 4	.....	1 14 4	.....
Sale of Rural Training Booklets—Wagga	9 8 3	.....	.....	9 8 3
Shannon Vale Nutrition Station Working Account ..	2,203 17 0	2,919 2 7	3,092 15 2	2,030 4 5
Stamp Duty on Agreement—Wheat Stacking Sites ..	0 15 0	.....	0 15 0	.....
State Wheat Pools Account (Payment of Dr. Noble's Expenses of Overseas Trip)	53 7 6	.....	53 7 6	.....
Tropical Fruit Research Station	5,000 0 0	.....	.....	5,000 0 0
Unclaimed Salaries and Wages	353 19 2	1,820 7 3	1,904 15 0	269 11 5
N.S.W. Wheat Industry Research Committee—Grant for expanded Wheat Research Projects, Wagga Agricultural Research Institute .....	.....	5,723 0 0	4,548 5 5	1,174 14 7
Wheat Industry Research Council Grant for Investigation into Possibilities of Segregation of Wheats on the Basis of Quality .....	.....	4,000 0 0	2,626 10 8	1,373 9 4
Winter School for D. D. Holders—Entertainment	9 16 6	22 18 6	32 15 0	.....
£	305,136 12 10	1,011,183 18 8	874,613 11 3	441,707 0 3

Brief details of the legislation covering some of the more important of these accounts, together with short histories of the operations conducted under each of them, were given in the Annual Report for 1957-58.

The following additional information is now offered in respect of such of the accounts as appear to warrant further amplification:—

Swine Compensation Fund—

	£ s. d.
Balance at 1st July, 1958	92,372 1 2
Receipts—	
Stamp Duty	29,606 10 8
	121,978 11 10
Disbursements—	£ s. d.
Swine Compensation	20,463 14 4
Commission on sale of Duty Stamps	64 0 8
	20,527 15 0
Balance as at 30th June, 1959	£101,450 16 10

Cattle Compensation Act, 1951 (as amended)

The following tabulation shows the various diseases for which cattle were condemned and the amount of compensation paid, together with the particulars of receipts during the year :—

Disease	Claims			Animals			Payments		Total
	Reg. 5	Reg. 6	Total	Reg. 5	Reg. 6	Total	Reg. 5	Reg. 6	
Tuberculosis	2,218	2,563	4,781	7,994	3,643	11,637	£ s. d.	£ s. d.	£ s. d.
Cancer	1,912	300	2,212	2,621	312	2,933	140,231 11 1	79,371 15 4	219,603 6 5
Actinomycosis	2,054	28	2,082	2,475	30	2,505	30,879 5 7	6,113 14 1	36,992 19 8
Actinobacillosis	608	5	613	757	5	762	27,527 19 9	340 11 5	27,868 11 2
Pleuro Pneumonia Contagiosa ..	14	..	14	23	..	23	7,602 0 11	44 7 5	7,646 8 4
Trichomoniasis	12	..	12	25	..	25	384 15 6	.....	384 15 6
Tick Fever	14	..	14	32	..	32	290 17 1	.....	290 17 1
John's Disease	5	..	5	6	..	6	607 9 10	.....	607 9 10
Vibrosis	..	..	..	..	..	..	87 10 0	.....	87 10 0
Totals	6,837	2,896	9,733	13,933	3,990	17,923	£207,611 9 9	85,870 8 3	293,481 18 0

Less: Recoveries

Net Compensation paid

14 10 0

£293,467 8 0

SUMMARY OF RECEIPTS AND PAYMENTS

	£	s.	d.	£	s.	d.
Balance of Fund as at 1st July, 1958 (a) .....	.....			12,998	8	7
Add Receipts—						
Levy	271,068	10	2			
	£	s.	d.			
Sale of Stamps	135,398	12	4			
Less Commission	82	8	8			
	135,316	3	8			
Court Action <i>re</i> Stamp Duty	13	19	4			
				406,398	13	2
				£419,397	1	9
Less Payments—						
Compensation	293,467	8	0			
Independent Valuers	4	4	0			
Administrative Costs—						
Pastures Protection Board Secretaries (1st January, 1958, to 30th June, 1959)	3,187	10	0			
Department of Agriculture	13,138	16	11			
				309,797	18	11
Balance of Fund as at 30th June, 1959 (a)				£109,599	2	10

Note.—(a) An amount of £50,000 advanced by the State Treasury was held in the Fund in addition to the balance shown to cover any temporary excess of payments over receipts. This sum has been excluded from the balance in order that the true position of the Fund may be shown.

Commonwealth Dairy Industry Extension Grant

The Commonwealth Government has agreed to the continuance of the grant for a period of five years, ending 30th June, 1963, under the terms and conditions set out in the Department's report for the year ended 30th June, 1953.

The first grant was received in October, 1948, and the expenditure to 30th June, 1959, amounted to £679,660 1s. 0d. under the following headings :—

Item	1948-49 to 1957-58	1958-59	Total
	£ s. d.	£ s. d.	£ s. d.
Organising Officers	109,450 6 8	12,167 16 1	121,618 2 9
General Publicity	56,542 17 3	7,931 17 6	64,474 14 9
Demonstrations	144,101 12 3	7,890 8 2	151,992 0 5
Competitions	7,437 7 4	.....	7,437 7 4
Field Days	88 15 7	.....	88 15 7
Herd Recording	165,051 11 8	22,471 19 3	187,523 10 11
Artificial Insemination	60,075 15 3	.....	60,075 15 3
Statistical Work	18,034 1 9	.....	18,034 1 9
Herd Surveys	26,165 6 8	.....	26,165 6 8
Punch Card Equipment	15,181 13 1	2,134 7 0	17,316 0 1
Milking Machine Survey	7,475 8 7	.....	7,475 8 7
Contribution towards attendance of representative at International Study Centre	400 0 0	.....	400 0 0
Contribution towards attendance of representative at Maryland University	806 16 3	.....	806 16 3
Milking Machine Testing Station	210 13 8	4,672 0 9	4,882 14 5
Survey—Infertility of Herds	310 7 1	1,579 5 4	1,889 12 5
Agricultural Trainees	4,000 0 0	4,000 0 0	8,000 0 0
Sire Survey .....	.....	351 19 11	351 19 11
Overseas Visit—Miss N. M. Foskett .....	.....	1,127 13 11	1,127 13 11
	£ 615,332 13 1	64,327 7 11	679,660 1 0

Commonwealth Grant—Expansion of Agricultural Advisory Services—N.S.W.

The Commonwealth Government agreed to make grants to the States for a period of five years ending 30th June, 1957, to permit of the expansion of the Agricultural Advisory Services, and subsequently agreed to continue the grants, at a lower rate, for a further period of three years ending 30th June, 1960.

There was an unexpended balance on the Grant account at 1st July, 1958, of £12,613 11s. 11d.; grants made by the Commonwealth for the year amounted to £62,500 and miscellaneous receipts amounted to £856 6s. 5d. Net expenditure was £63,745 14s. 0d., leaving an unexpended balance of £18,564 19s. 0d. at 30th June, 1959. The expenditure to date has been as follows :—

Financial Year	Amount
	£ s. d.
1952-53	981 8 11
1953-54	45,303 5 9
1954-55	51,116 18 7
1955-56	69,362 4 8
1956-57	78,022 5 1
1957-58	71,971 17 7
1958-59	63,745 14 0
	£380,503 14 7

Noxious Insects Destruction Account

The Noxious Insects Act of 1934 provides for the striking of a levy under specified conditions as a contribution towards the cost of suppression and destruction of noxious insects. The revenue as received is paid into Special Deposits Account. Moneys at the credit of this account are applied by the Minister for the purposes prescribed in the Act.

Expenditure from this account has been greater this year than in 1957-58 as the result of an outbreak of grasshoppers, the eradication of which was undertaken by ground spraying in the first instance and subsequently by the use of aircraft. This activity is dealt with elsewhere in this report.

Following is a statement of receipts and payments during the year 1958-59 :—

RECEIPTS			PAYMENTS		
	£	s. d.		£	s. d.
Balance as at 1st July, 1958	57,731	10 9	Poison and Materials	5,492	10 0
Levies	518	7 2	Aeroplane Hire	5,109	9 0
Sales of Equipment, etc.	228	2 0	Air Insurance Cover	15	7 6
			Share of cost of Patrol Officer	888	0 0
			Maintenance of Motor Vehicles	236	15 2
			Advertising	26	13 1
			Equipment Purchases and Repairs	67	18 11
			Travelling Expenses	348	11 4
			Freight and Cartage	146	16 11
			Payroll Tax	0	11 11
			Supplies	105	2 3
			Casual Labour	170	17 6
			Telephone Services	3	10 0
			Balance as at 30th June, 1959	45,865	16 4
	£58,477	19 11		£58,477	19 11

Argentine Ant Eradication Campaign

The campaign to eradicate the Argentine Ant was continued during 1958-59.

Twenty new infestations were reported during the year, bringing the total number of areas that have been subjected to infestation to 198. Approximately 4,714 acres have now been sprayed, including 820 acres during this current year.

The following is a statement of receipts and payments covering campaign activities for the year 1958-59 :—

RECEIPTS			PAYMENTS		
	£	s. d.		£	s. d.
Balance as at 1st July, 1958	890	16 10	Wages	9,722	2 9
Consolidated Revenue Fund	8,100	0 0	Payroll Tax	145	17 1
Council Contributions—	£	s. d.	Travelling Expenses	208	15 0
Auburn	1,997	14 0	Motor Vehicle Maintenance and Running Costs	496	2 5
Bankstown	903	7 7	Spray Materials	5,360	12 1
Baulkham Hills	8	0 3	Spray Plant Maintenance and Running Costs ..	141	6 1
Blacktown	284	15 2	General Stores and Expenses	201	8 3
Botany	1,209	10 9	New Plant	775	1 6
Canterbury	313	13 8	Rewards	136	0 0
Concord	166	18 0		17,187	5 2
Drummoyne	82	11 1	Balance carried forward at 30th June, 1959 ..	149	13 5
Fairfield	182	6 8			
Holroyd	416	10 0			
Hornsby	428	3 11			
Kogarah	50	3 10			
Liverpool	310	17 1			
Manly	48	11 9			
Marrickville	20	4 1			
Parramatta	621	11 7			
Rannwick	94	8 9			
Ryde	239	17 2			
Rockdale	331	2 2			
Strathfield	303	1 0			
Sutherland	31	12 1			
Sydney City	213	15 11			
Waverley	87	5 3			
	8,346	1 9			
	£17,336	18 7		£17,336	18 7

Pastures Protection Boards of New South Wales—Subsidy to Glenfield Veterinary Research Station

Receipts and payments for the year ended 30th June, 1959, were:—

RECEIPTS			PAYMENTS							
	£	s.	d.		£	s.	d.	£	s.	d.
Balance as at 1st July, 1958	712	15	4	Salaries—						
Contribution	2,969	5	4	Veterinary Bacteriologist (1st July, 1958, to 24th April, 1959 (½))	1,782	16	5			
				Veterinary Parasitologist (30th January, 1959, to 18th June, 1959)	821	8	10			
								2,604	6	3
				Employer's proportion of Superannuation Contributions				261	19	1
				Workers' Compensation Insurance Premium ..				111	5	4
				Advertising				1	16	0
				Travelling Expenses				2	15	0
				Balance as at 30th June, 1959	700	0	0			
	£3,682	0	8					£3,682	0	8

Potato Growers' Licensing Act, 1940 (as amended)

Transactions on the Special Deposits Account for the financial year 1958-59 were:—

RECEIPTS			PAYMENTS		
	£	s. d.		£	s. d.
Balance as at 1st July, 1958	590	1 5	Grants to Potato Growers' Association	1,380	0 0
Licence Fees.....	1,747	3 0	Administrative Costs, 1957-58	80	17 0
			Postages	59	18 11
			Printing and Stationery	25	13 9
			Balance at 30th June, 1959	790	14 9
	£2,337	4 5		£2,337	4 5

Shannon Vale Nutrition Station—Working Account

Statement of Receipts and Payments for the year ended 30th June, 1959:—

RECEIPTS				PAYMENTS			
	£	s.	d.	£	s.	d.	
Balance at 1st July, 1958				2,203	17	0	
Sale of Wool	2,091	7	4				Wages
Sale of Livestock	778	9	11				Payroll Tax, 1957-58
Sale of Skins	14	7	8				Freight and Cartage
Rent of Cottage	34	17	8				Fertilizers
				2,919	2	7	General Supplies
							Fencing and Wire Netting
							Plant Purchases and Repairs
							Motor Spirit and Oil
							Tractor—Third Party Insurance and Registration
							Balance at 30th June, 1959
				£5,122	19	7	£5,122 19 7

OTHER ACCOUNTS

Contribution by Milk Board to meet cost of Herd Testing for Tuberculosis

Although these operations are within the framework of the Consolidated Revenue Fund, separate accounts are kept within the Department to show the annual financial result. The following statement shows Receipts and Payments for the year ended 30th June, 1959, in respect of this service:—

RECEIPTS			PAYMENTS		
	£	s. d.		£	s. d.
Contribution from Milk Board (a)	4,600	8 7	Salaries	3,503	3 0
Balance payable by Milk Board	172	18 7	Employer's Superannuation Contribution ..	328	4 9
			Travelling Expenses	744	11 11
			Postage and Telephones	12	4 6
			Printing	19	2 0
			Workers' Compensation Insurance Premiums ..	59	17 6
			Payroll Tax	106	3 6
	£4,773	7 2		£4,773	7 2

Note.—(a) £182 19s. 0d. was also received in 1958-59 in respect of 1957-58.

Veterinary Surgeons' Act, No. 25 of 1923

The Act provides for the establishment of a Board to be called "Board of Veterinary Surgeons of New South Wales." Fees and penalties collected under the Act are paid to the credit of Consolidated Revenue Fund, from which administrative expenses are met. At 30th June, 1959, there were 411 registered Veterinary Surgeons.

Receipts and Payments for the financial year 1958-59 were:—

RECEIPTS			PAYMENTS		
	£	s. d.		£	s. d.
Registration Fees	22	1 0	Salaries	502	15 5
Restoration Fees	9	9 0	Members' Fees	69	6 0
Roll Fees	865	4 0	Travelling Expenses	6	1 4
Examination Fees	52	10 0	Postage	10	9 7
			Printing	32	10 7
			Examination of Foreign Graduates—		
			Examination Fees	63	0 0
			Travelling Expenses	37	9 2
				100	9 2
				721	12 1
			Excess Receipts over payments	227	11 11
	£949	4 0		£949	4 0

Meat Inspection Service

This service is administered under the Meat Industry Act, 1915 (as amended) which makes provision for inspection fees. These were varied from 1st July, 1958, and the new rates have operated for twelve months. Collections are paid into Consolidated Revenue Fund and expenditure is met therefrom.

The Metropolitan Meat Industry Board and the Department of Health bear the full cost of meat inspections at the State Abattoir, Homebush Bay, and Knackeries, respectively. The cost of the service at other Slaughterhouses is covered by fees collected.

The following statements show the cost of the service, the payments made by the Metropolitan Meat Industry Board and the Department of Health and the revenue received for 1958-59:—

EXPENDITURE			INCOME		
	£	s. d.		£	s. d.
Homebush Abattoir—			Receipts from Metropolitan Meat Industry Board	75,727	6 2
Salaries and Wages	70,209	3 1	Deduct amount recouped by Metropolitan Meat Industry Board in respect of 1957-58 and received in 1958-59	79	8 1
Retirement Leave Payments	754	8 4		75,647	18 1
Workers' Compensation Insurance	1,361	6 9	Balance—being amount to be recouped by Metropolitan Meat Industry Board in respect of the quarter ended 30th June, 1959	2,921	10 7
Endowment Fund Subsidy	955	12 11		£78,569	8 8
Employer's Superannuation Contributions	2,544	5 6	Regulation 7—Country Abattoirs	108,496	18 0
*Travelling Expenses	81	7 2	Regulation 8—Interstate	21,242	2 3
*Freight and Cartage	0	1 0	Regulation 9—Other Abattoirs in County of Cumberland	19,688	6 4
*Postal and Telephone Expenses	106	5 7	Regulation 10—Private Saleyards	319	14 7
*General Stores	800	9 8	Inspection Fees—Government Institutions ..	400	0 0
Payroll Tax	1,756	8 8		150,147	1 2
	£78,569	8 8	Deduct Inspection Fees Owing at 30th June, 1958	8,840	13 3
Other Slaughterhouses—				141,306	7 11
Salaries and Wages	98,688	6 8	Add—Inspection Fees Owing at 30th June, 1959	6,751	17 5
Retirement Leave Payments	1,131	12 6		£148,058	5 4
Temporary Assistance	200	4 6	Recoup of Expenditure received from Department of Health	2,943	14 9
Workers' Compensation Insurance	1,896	17 11	Deduct amounts received in respect of expenditure incurred in 1957-58	290	17 4
Endowment Fund Subsidy	1,946	19 2		2,652	17 5
*Rent	145	5 0	Add amounts accrued due in respect of expenditure 1958-59 unpaid at 30th June, 1959, and recoverable from Department of Health	564	7 5
*Travelling Expenses	8,239	16 2		£3,217	4 10
*Freight and Cartage	15	2 8			
*Postal and Telephone Expenses	177	9 7			
*General Stores, etc.	971	12 1			
*Gas and Electricity	5	1 10			
Employer's Superannuation Contribution ..	6,444	16 2			
Payroll Tax	2,638	7 7			
Excess of Income over Expenditure	25,556	13 6			
	£148,058	5 4			
Knackeries—					
Salaries and Wages	2,206	11 9			
Workers' Compensation Insurance	42	18 8			
Endowment Fund Subsidy	105	8 10			
Travelling Expenses	557	3 11			
Surcharge on Salaries to provide for leave, etc.	305	1 8			
	£3,217	4 10			

* These represent actual payments; accruals have not been taken into consideration.

Fund Created by Wheat Marketing (Barring of Claims) Act, 1929 (as amended)

REVENUE ACCOUNT FOR THE YEAR ENDED 30TH JUNE, 1959

	£	s.	d.		£	s.	d.
To Balance—Net surplus transferred to Accumulated Funds Account.....	1,526	9	5	By Interest on Investments (Government Securities)	1,509	5	6
				„ Bank Interest	17	3	11
	£1,526	9	5		£1,526	9	5

BALANCE SHEET AS AT 30TH JUNE, 1959

LIABILITIES				ASSETS			
	£	s.	d.		£	s.	d.
Accumulated Funds as at 1st July, 1958	40,574	12	3	Investments in Government Securities (face value)	40,520	0	0
Net Surplus for the year ended 30th June, 1959	1,526	9	5	Balance at Commonwealth Savings Bank	1,147	10	0
				Interest accrued to 30th June, 1959	433	11	8
	£42,101	1	8		£42,101	1	8

STATEMENT OF RECEIPTS—CONSOLIDATED REVENUE FUND—FINANCIAL YEAR, 1958-59

Institution	Sale of Farm Produce and Livestock, etc.			Students' Fees			Rents, etc.			Other Receipts			Net Receipts		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Hawkesbury Agricultural College	15,742	15	8	39,478	6	0	5,633	8	2	4,869	1	7	65,723	11	5
Wagga Agricultural College and Experiment Station	9,782	4	10	13,995	0	1	6,787	14	3	588	10	10	31,153	10	0
Alstonville Tropical Fruit Research Station ..							50	8	8				50	8	8
Bathurst Experiment Farm	11,646	18	2				214	16	5	8	16	2	11,870	10	9
Condobolin Experiment Farm	3,956	14	8				156	17	6	112	18	3	4,226	10	5
Cowra Experiment Farm	3,729	19	1				122	17	6	30	17	6	3,883	14	1
Gosford Citrus Experiment Station	1,072	2	8				167	19	5	683	9	8	1,923	11	9
Grafton Experiment Farm	8,090	2	2				351	10	10	128	10	0	8,570	3	0
Griffith Viticultural Nursery	506	19	10				40	10	2				547	10	0
Leeton Experiment Farm	7,773	8	4				243	6	11	6	4	3	8,022	19	6
Lower Murray Research Station							103	3	9				103	3	9
Narrabri Experiment Farm							203	8	2				203	8	2
New England Experiment Farm	5,453	0	8				597	7	0	154	4	4	6,204	12	0
Seven Hills Poultry Experiment Station	5,577	9	11				206	18	4	2	15	3	5,787	3	6
Tamworth Agricultural Experiment Station ..	60	8	11				71	16	6				132	5	5
Temora Experiment Farm	4,815	4	7				471	12	1	96	18	1	5,383	14	9
Trangie Agricultural Experiment Station	13,567	6	9				1,877	18	7	283	5	4	15,728	10	8
Wollongbar Experiment Farm	6,107	7	7				498	4	9	31	11	4	6,637	3	8
Yanco Experiment Farm	12,409	14	10	117	9	0	2,596	15	6	3	11	10	15,127	11	2
Total	£110,291	18	8	53,590	15	1	20,396	14	6	7,000	14	5	191,280	2	8

Division	Particulars	Net Receipts
Central Administration	Fees—Farm Produce Agents' Act, 1926-1932	£ 311 s. 5 d. 6
	Fees—Fertilisers Act, 1934	235 4 0
	Fees—Apiary Registrations	2,503 0 3
	Fees—Pest Destroyers Act, 1945	577 12 0
	Fees—Registration of Stock Brands	1,153 15 7
	Fees—Registration of Swine Brands	88 19 5
	Fees—Stock Foods and Medicines Act, 1940	1,430 1 0
	Fees—Veterinary Surgeons' Act, 1923	949 4 0
	Fees—Public Officers'—Witness Expenses	4 0 0
	Fees—Analyses	57 8 6
	Fees—Flour Certificates	69 7 0
	Fines and Forfeitures	34 11 0
	Forfeitures of Bonds	4,047 16 4
	Commission for collection of Premiums—Group Assurance Scheme	782 18 5
	Commission for collection of Premiums—Hospital Contribution and Medical Benefits Funds	190 6 5

Statement of Receipts—Consolidated Revenue Fund—Financial Year 1958-59—continued

Division	Particulars	Net Receipts		
		£	s.	d.
Central Administration—continued	Commission for collection of subscriptions—Public Service and Professional Officers' Associations	146	2	1
	Commission on collection of Judgment Debts	22	14	10
	Interest on Advances from A.D.W.A.	1	10	0
	Sundry Sales			
	Sale of Government Property	474	4	6
	Transfer of Part Balances not required	49	11	2
	Exchange on Cheques and Remittances	196	16	8
	Three per cent. Contribution by Pastures Protection Boards	20,370	10	7
	Broadcasting Fees	18	16	11
	License Fees—Pastures Protection Act	17	5	0
	Postages	15	17	8
	Employer's Liability to State Superannuation Fund	3,789	13	10
	Administration of Cattle Compensation Fund	13,138	16	11
	Fees—Public Officers'—Jurors	15	17	0
	Conscience Money	0	6	0
	Total	£ 50,693	12	7
Division of Plant Industry	Fees—Certification of Seed	5,464	6	0
	Fees—Certification of Bean Seed	1,114	7	6
	Fees—Certification of Sweet Sorghum Seed	704	19	6
	Fees—Registration of Hybrid Seed Maize	2,666	8	6
	Fees—Seed Testing	616	4	11
	Commonwealth Contribution towards Administration of Plant Quarantine	1,568	19	5
	Total	£ 12,135	5	10
Division of Horticulture	Fees—Inspection—Plant Diseases Act	5,060	19	9
	Fees—Fumigation—Plant Diseases Act	7	1	11
	Fees—Certification of Seed Potatoes	984	2	8
	Contribution by Commonwealth Government—Administration of Commerce Act	7,457	16	10
	Administration of Plant Quarantine	27,351	8	8
	Rent of Premises—George Street North	278	13	9
	Exchange on Cheques and Remittances	0	0	6
	Total	£ 41,140	4	1
Division of Dairying	Fees—Grading—Dairy Industry Act	4	2	8
	Fees—Licence—Dairy Industry Act	9	0	0
	Fees—Registration—Dairy Industry Act	13	0	0
	Fees—Dairy Science Schools	180	13	5
	Fees—Herd Recording	33,784	1	8
	Commonwealth Grant towards cost of Herd Recording	22,471	19	3
	Total	£ 56,462	17	0
Division of Animal Industry— Head and District Offices	Fees—Cattle Export	98	11	0
	Fees—Chicken Sexing Examinations			
	Fees—Honey Certificates	36	5	6
	Fees—T.B. Testing of Cattle	202	18	6
	Fees—Vaccination of Calves	8	4	0
	Fees—Inspection of Pigs			
	Fees—Meat Inspection	228,818	2	1
	Contribution by Commonwealth Government—Administration of Animal Quarantine	12,824	6	1
	Contribution by Milk Board—T.B. Testing of Herds	4,783	7	7
	Rent—Pymont Depot	1,430	0	0
	Glenfield Veterinary Research Station—			
	Sale of Farm Produce, etc.	5,563	18	8
	Telephone Calls (Private)	21	0	6
	Electricity supplied to Officers	128	3	11
	Exchange on Cheques and Remittances	1	10	6
	Rents	313	1	8
	Total	£ 254,229	10	0
Division of Animal Industry— Queensland Border	Fees—Dipping Stock	8,097	2	0
	Rents	858	9	0
	Exchange on Cheques and Remittances	7	6	9
	Total	£ 8,962	17	9
Division of Animal Industry— Tick Quarantine Areas	Fees—Fumigation	28	12	2
	Rents	86	13	4
	Exchange on Cheques and Remittances	0	0	6
	Contribution by Commonwealth Government in respect of Cattle Tick Eradication	578,017	19	6
	Sale of Government Property	411	0	0
	Total	£ 578,544	5	6

Statement of Receipts—Consolidated Revenue Fund—Financial Year 1958-59—*continued*

Division	Particulars	Net Receipts		
Royal Botanic Gardens and Allied Activities	Rents—Exclusive of Land (Ground Fees, Kiosk Rents, etc.)	£	s.	d.
	Lavatory Takings	2,010	1	6
	Sale of Government Property	127	0	11
	Rents	55	0	0
	Contribution by Commonwealth Government—Maintenance of Gardens at Admiralty and Kirribilli Houses	569	11	7
	Total	7,319	6	4
Department of Agriculture	Total	£	10,081	0 4
	Repayments to Credit of Vote—Previous Years—Hawkesbury and Wagga Agricultural Colleges and Experiment Farms	4,735	6	11
	Other	9,404	10	10
	Total	£	14,139	17 9

SUMMARY OF RECEIPTS

Particulars	Net Receipts		
	£	s.	d.
Agricultural Colleges, Farms, Stations and Nurseries	191,280	2	8
Central Administration, Divisions, etc.	1,012,249	13	1
Department of Agriculture—Repayments to Credit of Vote—Previous Years	14,139	17	9
Total	£	1,217,669	13 6

EXPENDITURE FROM CONSOLIDATED REVENUE FUND AND GENERAL LOAN ACCOUNT, 1958-59
(See Separate Statement for Expenditure from Special Deposits Account)

Section	Consolidated Revenue Fund				General Loan Account	Total Expenditure by Department of Agriculture	Expenditure by Other Departments					Grand Total Expenditure						
	Salaries and Payments in the nature of Salary	Maintenance and Working Expenses other than Salaries	Other Services	Total			Consolidated Revenue Fund						General Loan					
							Government Stores Department (1)	Government Printer	Government Real Estate Office	Department of Public Works (2)	Department of Public Works							
														Total Expenditure by Other Departments				
£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.	£	s. d.					
Central Administration	541,690	13 3	74,277	6 3	60,747	7 4	676,705	7 2	49,833	0 11	24,793	13 6	38,350	8 0	263,657	5 0	940,362	12 2
Division of Plant Industry	171,616	10 3	32,115	13 8	4,127	1 4	207,859	5 3	.....	.....	721	18 3	.....	.....	721	18 3	208,581	3 6
Division of Horticulture	113,212	16 0	22,046	12 4	2,862	12 7	138,122	0 11	.....	.....	236	5 9	3 19	6	240	5 3	138,362	6 2
Export and Import Branch	12,649	2 5	761	0 2	1,950	0 7	15,360	2 7	.....	.....	.....	.....	126	4 1	155	19 7	15,516	2 2
Plant Quarantine Service	25,847	6 0	2,461	1 8	.....	.....	28,308	7 8	.....	.....	.....	.....	.....	.....	.....	.....	28,308	7 8
Division of Dairying—	74,155	4 10	14,573	12 7	100	0 0	88,828	17 5	.....	.....	68	11 3	.....	.....	68	11 3	88,897	8 8
General	68,639	19 1	20,905	17 6	956	0 0	90,501	16 7	.....	.....	1,009	0 2	3,520	16 3	10,968	14 0	90,501	16 7
Herd Recording	127,781	2 4	68,209	11 3	17,689	4 7	213,679	18 2	.....	.....	328	3 4	775	0 0	3,488	17 9	234,821	11 2
Hawkesbury Agricultural College	63,278	10 7	30,605	19 3	8,464	13 0	102,349	1 3	.....	.....	.....	.....	.....	.....	.....	.....	111,923	11 10
Wagga Wagga Agricultural College	15,918	13 0	5,383	16 11	.....	.....	1,317	12 3	.....	.....	30	9 4	396	0 8	756	3 6	11,039	0 8
Alstonville Tropical Fruit Research Station	18,111	13 0	2,890	17 1	861	12 2	21,474	7 11	.....	.....	110	7 6	.....	.....	110	7 6	22,230	10 11
Bathurst Experiment Farm	12,709	5 0	1,286	2 9	1,286	2 9	20,586	5 3	4,080	0 0	21,474	7 11	.....	.....	21,474	7 11	24,673	9 2
Condonbolin Experiment Farm	15,128	19 0	4,926	1 2	1,860	18 8	15,463	2 10	2,063	4 8	17,526	7 6	51	0 0	18	7 0	19,037	18 8
Cowra Experiment Farm	8,675	13 0	4,926	1 2	1,860	18 8	15,463	2 10	2,063	4 8	17,526	7 6	51	0 0	18	7 0	19,037	18 8
Cowra Experiment Farm	15,021	3 4	4,926	1 2	1,860	18 8	15,463	2 10	2,063	4 8	17,526	7 6	51	0 0	18	7 0	19,037	18 8
Gosford Citrus Research Station	28,622	17 3	2,693	13 3	420	13 10	17,592	0 10	8,527	0 0	26,119	0 6	25	4 0	462	6 0	42,138	12 6
Granton Experiment Farm	4,049	8 2	378	7 11	2,693	13 3	39,404	19 6	2,271	12 6	41,676	12 0	28	0 0	38	6 0	44,556	2 1
Granton Experimental Nursery	17,075	7 9	11,221	15 11	4,517	12 4	32,814	16 0	3,671	9 7	36,486	5 7	293	1 0	619	13 10	37,105	19 5
Leeton Experiment Farm	1,945	9 5	837	13 7	38	18 1	2,822	1 1	2,822	1 1	36,486	5 7	363	5 0	365	5 0	31,887	6 1
Lower Murray Research Station	3,258	14 8	1,709	10 3	445	3 2	4,968	4 1	12,332	7 9	27,043	4 7	6	1 6	6	1 6	17,306	14 2
Narrabri Experiment Farm	21,480	15 8	5,117	5 9	642	8 5	27,043	4 7	.....	.....	85	7 6	242	19 6	328	1 2	27,371	5 9
New England Experiment Farm	14,270	12 11	6,063	11 5	448	18 0	20,976	12 9	3,672	3 10	24,504	16 0	91	16 5	385	1 10	25,033	17 10
Seven Hills Poultry Experiment Station	4,477	15 8	5,077	19 7	48	18 0	9,604	13 3	2,152	3 10	14,558	17 1	3	5 6	3	5 6	11,760	2 7
Tamworth Agricultural Experiment Station	12,089	12 6	5,214	18 11	994	1 4	18,298	12 9	.....	.....	21	10 7	82	10 5	237	9 0	18,536	1 9
Temora Experiment Farm	21,183	4 9	10,375	11 1	2,836	15 8	34,305	7 9	3,305	0 0	37,700	12 0	94	3 2	2,246	16 0	39,947	8 0
Triangle Agricultural Experiment Station	6,990	5 1	5,861	9 8	1,353	13 3	13,153	13 3	.....	.....	28	14 8	44	0 0	319	9 6	24,526	17 3
Wollongbar Experiment Farm	34,169	15 6	20,515	9 8	3,138	9 6	57,833	14 8	1,892	0 0	59,725	14 8	556	2 0	1,867	5 2	61,592	19 10
Yanco Experiment Farm .....	.....	.....	.....	.....	2,250	0 0	2,250	0 0	.....	.....	2,250	0 0	.....	.....	.....	.....	2,250	0 0
Tobacco Research	154,281	16 4	26,005	3 6	5,320	12 8	185,607	12 6	.....	.....	185,607	12 6	279	4 6	736	18 10	186,344	11 4
Division of Animal Industry—	47,800	11 8	8,661	12 8	2,627	12 2	59,089	16 6	.....	.....	59,089	16 6	.....	.....	1,450	7 2	60,540	3 8
Head and District Offices .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Glennfield Veterinary Research Station .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Manly Veterinary Research Station .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Meat Inspection Service—	70,963	11 5	1,943	16 4	.....	.....	72,907	7 9	.....	.....	72,907	7 9	.....	.....	.....	.....	72,907	7 9
Homebush	100,020	3 8	11,356	1 6	.....	.....	111,376	5 2	.....	.....	111,376	5 2	.....	.....	.....	.....	111,376	5 2
Other Abattoirs	2,031	0 6	644	12 3	.....	.....	2,675	12 9	.....	.....	2,675	12 9	.....	.....	.....	.....	2,675	12 9
Knackeries	13,212	9 6	1,432	15 9	.....	.....	14,645	5 3	.....	.....	14,645	5 3	.....	.....	.....	.....	14,645	5 3
Animal Quarantine Service	42,849	16 1	14,427	6 2	.....	.....	57,277	2 3	1,150	0 0	58,427	2 3	.....	.....	.....	.....	58,427	2 3
Queensland Border Control	686,113	3 1	288,832	19 5	56,601	18 3	1,031,548	1 1	.....	.....	1,031,548	1 1	.....	.....	.....	.....	1,031,548	1 1
Tick Quarantine Areas	111,490	12 1	6,568	15 5	3,678	12 8	121,738	0 2	.....	.....	121,738	0 2	455	6 6	1,573	11 11	123,311	12 1
Royal Botanic Gardens and Allied Activities .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Totals	£2,659,585	2 1	725,949	8 2	188,526	14 7	3,574,061	4 10	71,097	1 10	29,012	17 2	7,483	8 6	290,813	6 0	3,935,971	12 8

(1) Being Expenditure on—
Stores, Stationery, Furniture, etc.

(2) Being Expenditure on—
Gas and Electricity

The amount of £14,848 7s. 8d.—Telephone Services—for all Sections of the Department has been included in the total for "Central Administration."

APPENDIX II

Published Matter*, 1958-59

*Viz.:—Matter printed as Department of Agriculture (D. of A.) booklets, or contributed to and printed as articles in Department of Agriculture journals (the monthly *Agricultural Gazette of N.S.W.*, the quarterly *Review of Marketing* and *Agricultural Economics*, the bi-monthly *Dairy Topics*) or the journals of other institutions/organisations.

The Appendix does not list the many times greater volume of items contributed, in the course of extension service, to such media as the Department's weekly printed broadsheet, *Press Copy*, and regional publicity releases, for newspapers and radio stations. A statistical account of that published matter is included in this report under "Division of Information Services—Editorial Section" and "Regional Extension Services—Regional Publicity".

A. DIVISION OF PLANT INDUSTRY

D. of A. Booklets

- Anon.—Cabbage Culture. (Revised.) 14 pp., ill.
 Anon.—Growing Artichokes. 8 pp., ill.
 Anon.—Growing Celery. (Revised.) 6 pp., ill.
 Anon.—The Sweet Potato. (Revised.) 8 pp., ill.
 Anon.—Tomato Culture Under Glass. (Revised.) 30 pp., ill.
 Anon.—Tomato Culture, With Special Reference to the Early Crop. (Revised.) 22 pp., ill.
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 Godden, G. R.—Making Better Hay. 8 pp., ill.
 Horth, C. J. and French, B. Owen.—Irrigation—Answering Your Queries. (Revised.) 20 pp., ill.
 Kavanagh, L. R.—Cultivation of Cowpeas. 6 pp., ill.
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 Mead, K. J. and Noonan, J. B.—Value of Fodder Cane. *Agric. Gaz. N.S.W.* 70: 6, 296-299.
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 Horth, C. J. & French, B. Owen.—Irrigation Queries and the Answers. (Revised.) 15 pp.
 Holbeche, J. A.—Care of Newly-planted Deciduous Trees. (Revised.) 3 pp.
 Levitt, E. C. & McGillivray, K. D.—Growing Passion Fruit. (Revised.) 10 pp.
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C. DIVISION OF ANIMAL INDUSTRY

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(i) BIOLOGICAL BRANCH

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(iv) BOTANIST BRANCH

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* Officer of C.S.I.R.O.

G. HAWKESBURY AGRICULTURAL COLLEGE

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